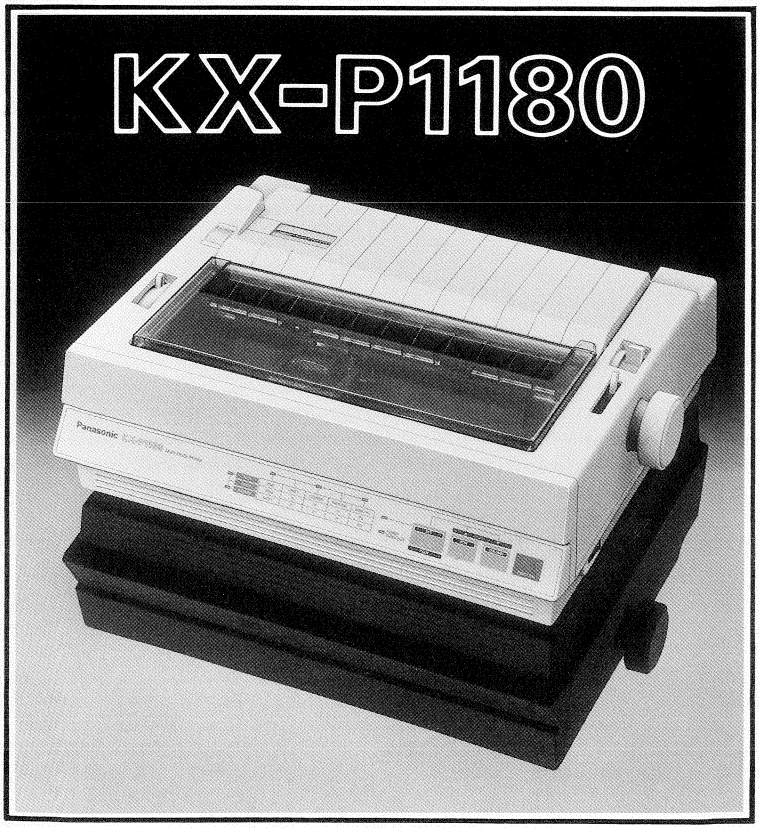
Operating Instructions

Impact Dot Matrix Printer



Panasonic

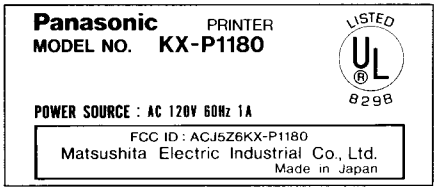
Before operating this unit, please read these instructions completely.

FOR USERS IN UNITED STATES ONLY

This equipment has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications set forth in Subpart J of Part 15 of the FCC Rules. If this equipment does cause interference to radio or television reception which can be determined by turning the equipment on and off, use the equipment in another location and/or utilize an electrical outlet different from that used by receiver. The user should use special accessories, such as a shielded cable, as recommended in these operating instructions, in order to continue to meet FCC emission limits and not possibly interfere with nearby radio and television reception.

The equipment should have an FCC ID No. on the nameplate.

Nameplate



FOR USERS IN CANADA

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

L'interférence radioélectrique générée par cet appareil numérique de type B ne dépasse pas les limites énoncées dans le Règlement sur les perturbations radioélectriques, section appareil numérique, du Ministère des Communications.

Any details given in these Operating Instructions are subject to change without notice.

FOR USE IN AUSTRALIA

FOR YOUR SAFETY

To ensure safe operation the three-pin plug supplied must be inserted only into a standard three-pin power point which is effectively earthed through the normal household wiring.

Extension cords used with the equipment must be three-core and be correctly wired to provide connection to earth. Wrongly wired extension cords are a major cause of fatalities.

The fact that the equipment operates satisfactorily does not imply that the power point is earthed and that the installation is completely safe. For your safety, if in any doubt about the effective earthing of the power point, consult a qualified electrician.

WARNING

- Power source voltage of this unit is listed on the nameplate. Do not fail to plug into the right voltage.
- To prevent fire or shock hazard, do not expose this product to rain or any type of moisture.

The serial number of the unit may be found on the label on the rear of the unit.
For your convenience, note this number below, and retain this book, along with your proof of purchase, to serve as a permanent record of your purchase in the event of a theft, or for future reference.

MODEL NO. **KX-P1180** NAME OF DEALER _____
SERIAL NO. _____ DATE OF PURCHASE _____

Microsoft is a registered trademark of Microsoft Corporation.
IBM and IBM-PC are registered trademarks of International Business Machines Corporation.
IBM Proprinter II and IBM NLQ II are trademarks of International Business Machines Corporation.
Apple is a registered trademark of Apple Computer, Inc.
FX-86e/FX-800 is a trademark of Seiko Epson Corporation.

Table of contents

Page

1. Introduction 1-1

1.1 Product Overview 1-1
1.2 Specifications 1-3
1.3 Names of the Parts 1-6
The Front View of the KX-P1180 1-6
The Top View of the KX-P1180 1-7
The Right View of the KX-P1180 1-8
The Rear View of the KX-P1180 1-8

2. Set up 2-1

2.1 Site Requirements 2-1
2.2 Unpacking and Inspection 2-1
2.3 Initial Setup 2-2
Removing the Protective Paper 2-2
Removing the Printer Cover 2-2
Mounting the Ribbon Cassette 2-3
2.4 Power Up 2-4
2.5 Adjusting the Printing Head Gap 2-4
2.6 Paper Installation 2-5
Single Sheet and Envelopes 2-5
Continuous Fanfold Paper from Rear 2-6
Continuous Fanfold Paper from Bottom 2-8
2.7 Aligning the Top of Form 2-10
2.8 Self Test 2-10
2.9 Connecting to Computer 2-11
2.10 DIP Switch Setting 2-11

3. Operation 3-1

3.1 Front Panel Switches 3-1
ON LINE Switch 3-1
LF Switch 3-2
FF Switch 3-2
FUNCTION Switch 3-3
3.2 Function Mode 3-4
Setting the EZ-Set Operator Panel 3-4
ROW Switch 3-4
COLUMN Switch 3-4
SET Switch 3-5
MEMO LOAD 3-7

Table of contents

Page

3.3 Detectors 3-8
Out of Paper Detector 3-8
Overheat Detector 3-8
3.4 Initialization 3-9
3.5 Hex. Dump 3-9

4. Software Introduction 4-1

4.1 Introduction 4-1
4.2 Control Codes 4-1
4.3 Entering Control Codes through Commercial Software Packages 4-2
4.4 Entering Control Codes Directly from the Keyboard 4-3
4.5 Entering Control Codes from Within a Program ... 4-4
4.6 Entering Hexadecimal Code 4-4
4.7 Control Codes 4-5
4.8 Special Code for IBM PC series 4-6

5. KX-P1180 Features 5-1

5.1 Print Feature Control 5-1
5.2 Download Characters 5-3
5.3 Bit Image (Graphics) 5-21

6. Software Commands 6-1

7. Interfacing 7-1

8. Maintenance 8-1

Appendix A Character Set Tables A-1
Appendix B Proportional Spacing Tables B-1
Appendix C Download Character Matrix Blanks C-1
Appendix D Paper D-1
Appendix E Printing Area E-1
Index I-1
OPTIONS and SUPPLIES

1. Introduction

1

1.1 Product Overview

This printer is a durable, highly reliable dot matrix printer. In addition, it has a small footprint, making it ideal for a compact workstation.

This printer uses a nine pin print head to form a 9×9 dot matrix character in Draft mode. In Near Letter Quality mode, the matrix for Courier, Prestige and Bold PS is 18×18; Sans Serif 18×9. Available are the complete Epson and IBM character sets as well as 13 international character sets.

In addition to Pica (10 characters per inch) and Elite (12 characters per inch) printing, this printer can print in Micron mode of 15 characters per inch, Compressed mode of 17 characters per inch and Elite Compressed mode of 20 characters per inch. Elite Compressed mode yields a total of 160 characters per line.

In addition to the five print pitches mentioned above, this printer has proportional spacing thus, six basic printing pitches are available.

The printer has an EZ-Set Operator Panel through which the user can select the most commonly used features and functions. A helpful feature is the QUIET mode which reduces printing noise. As convenience features, the printer has MEMO LOAD, PERFORATION CUT and MICRO LINE FEED. By using the MEMO LOAD, you can print a single sheet or envelope without removing or wasting the continuous fanfold paper. PERFORATION CUT gives you the ability to tear off a form without wasting paper. By using MICRO LINE FEED you can easily feed the paper to the exact printing position needed for preprinted forms. Section 3 in this manual explains these functions.

The high speed printing is done at 192 characters per second (cps) in Draft-Elite (12 cpi) pitch. In Draft-Pica (10 cpi) pitch, the printing speed is 160 cps. Processing speed is increased by Bi-directional printing. That is, the printer prints right-to-left as well as in the normal left-to-right manner. A logic seeking technique is also used, giving the printer a look-ahead capability which allows it to skip blank spaces at the beginning and the end of a line and the blank lines between paragraphs.

A wide variety of printing styles allows the user to create unique documents and drawings. You can print characters in double width, double height or compressed, emphasized or underlined and print super or subscripts, etc. Using Bit-mapped graphics, the printer can produce special effects ranging from company logos to photo-like images.

The printer has friction and tractor feed capabilities as standard features and handles continuous fanfold and single sheet paper as well as envelopes. This enables the user to create letters on company letterhead or print reports from the computer. It also allows continuous fanfold paper to be fed from beneath the printer in the tractor feed position.

The printhead life is designed for 100 million characters. The seamless ribbon can print up to four million characters and the cassette design makes changing the ribbon quick, easy and clean.

The printer also comes equipped with an internal standard 2K buffer. An additional 32K buffer is available as an option. This expands the total buffer size to 34K. The entire buffer area can be used as a receiving buffer or a portion can be used as a download font area. When the 32K buffer option is installed, the buffer area assignment is automatically selected.

Some software for your computer requires you to select a specific printer for the output. You should select Panasonic if it is listed. If Panasonic is not listed in the software, you may select one of the following:

- Epson FX-86e/FX-800...(DIP switch 1=OFF)
- IBM Proprinter II*...(DIP switch 1=ON)

Please check your DIP switches after making selection. Refer to Section 2.10.

* See Appendix A for applicable code

1

1.2 Specifications

Power requirements: Frequency: Current:	Refer to the nameplate located on the rear of the printer.
Interface:	Centronics parallel, RS-232C serial (option)
Printing fonts:	Draft (Pica&Elite), Near Letter Quality (Courier, Bold PS, Prestige, Sans Serif*), Dot Graphics
Software emulation:	Epson FX-86e/FX-800 (Standard Mode), IBM Proprinter II (IBM Mode)
Character set:	96 ASCII characters, 96 Italic ASCII characters, 32 International characters (13 countries), 32 Italic International characters (13 countries), 158 IBM special characters

Dot configuration: 3/254 inch (0.3 mm) dot diameter

	Draft (Pica)	NLQ	Sans Serif*
Dot alignment (Hor.×Ver.)	9×9	18×18	18×9
Dot pitch (Hor.)	1/120" (0.21 mm)		1/240" (0.11 mm)
(Ver.)	1/72" (0.35 mm)		1/144" (0.18 mm)

Maximum number of characters per line (cpl)		
	Pica (10 cpi)	80 cpl
	Elite (12 cpi)	96 cpl
	Micron (15 cpi)	120 cpl
	Compressed (17 cpi)	137 cpl
	Elite compressed (20 cpi)	160 cpl
	Pica elongated (5 cpi)	40 cpl
	Elite elongated (6 cpi)	48 cpl
	Semi Compressed elongated (7.5 cpi)	60 cpl
	Compressed elongated (8.5 cpi)	68 cpl

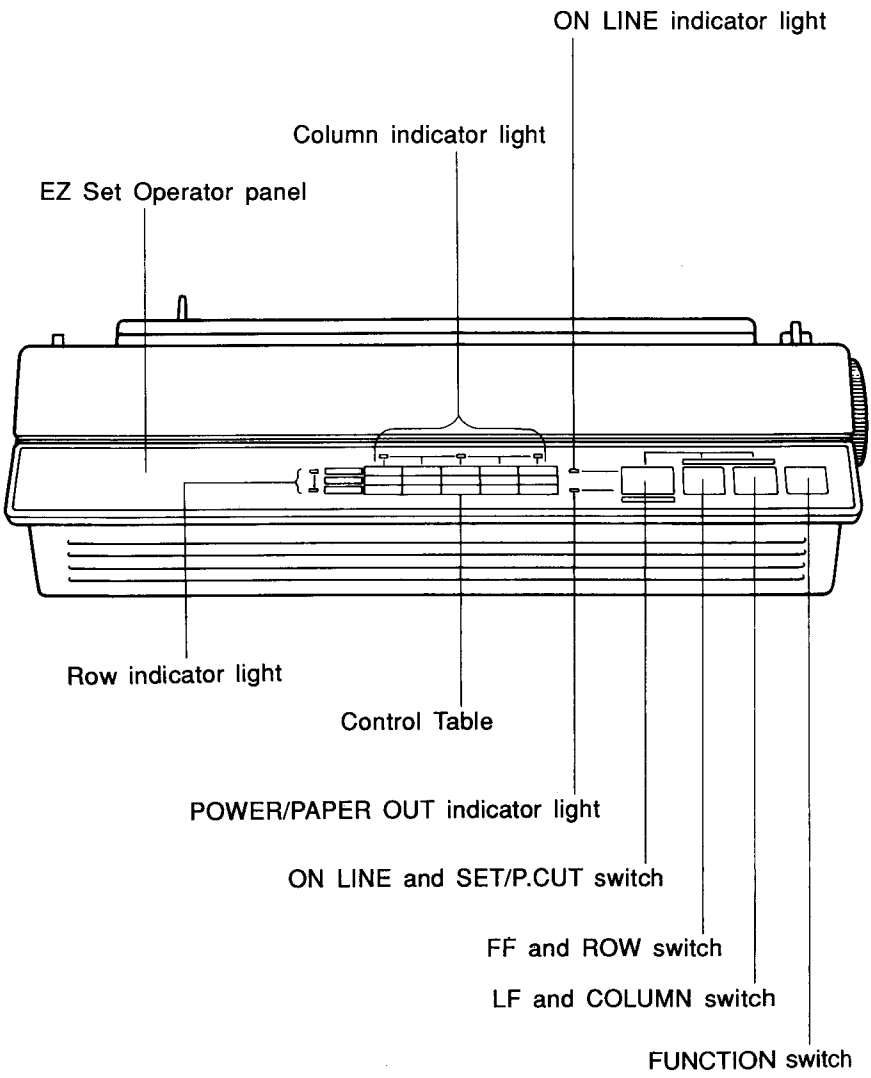
Sans Serif* is IBM NLQ.

Printing speed:	Draft-Elite	192 cps
	Draft-Pica	160 cps
	NLQ-Elite	38 cps
	NLQ-Pica	32 cps
Printing direction:	Text printing (Draft., NLQ): Bidirectional Bit Image printing: Unidirectional (left to right)	
Line feed time:	Approx. 100 msec [with 1/6 inch (4.2 mm) line feeding]	
Paper feed:	Tractor feed (with continuous fanfold paper) Friction feed (with single sheet or envelopes)	
Paper used:	Continuous fanfold paper: Width: 4~10 inches (102~254 mm) Single sheet: Width: 4~11.7 inches (102~297 mm) Height: 5~14.3 inches (127~363 mm) Thickness (paper weight in pound and g/m²): 14~24 pounds/53~90 g/m² (only 1 sheet) Envelopes: Standard business envelope ie: # 10 size (Refer to Appendix D.)	
Copies:	Original plus 3 non-carbon copies	
Paper thickness:	Total thickness of sheets must be less than 0.013 inch (0.32 mm)	
Operating environment:	50°F (10°C) to 95°F (35°C) temperature, 30~80% humidity (Please allow the printer to stabilize at room temperature within the operating temperature range before operation.)	
Storage environment:	–4°F (–20°C) to 140°F (60°C) temperature, 10~90% humidity	

Head life:	Approx. 100 million characters in draft mode
Ribbon:	Specially designed cassette seamless ribbon Ink color: Black Life: Approx. 4 million characters in draft mode
Dimensions:	16.7 (W) × 13.4 (D) × 5.2 (H) in. (423×341×133 mm)
Weight:	Approx. 14.1 lbs (6.4 kg)

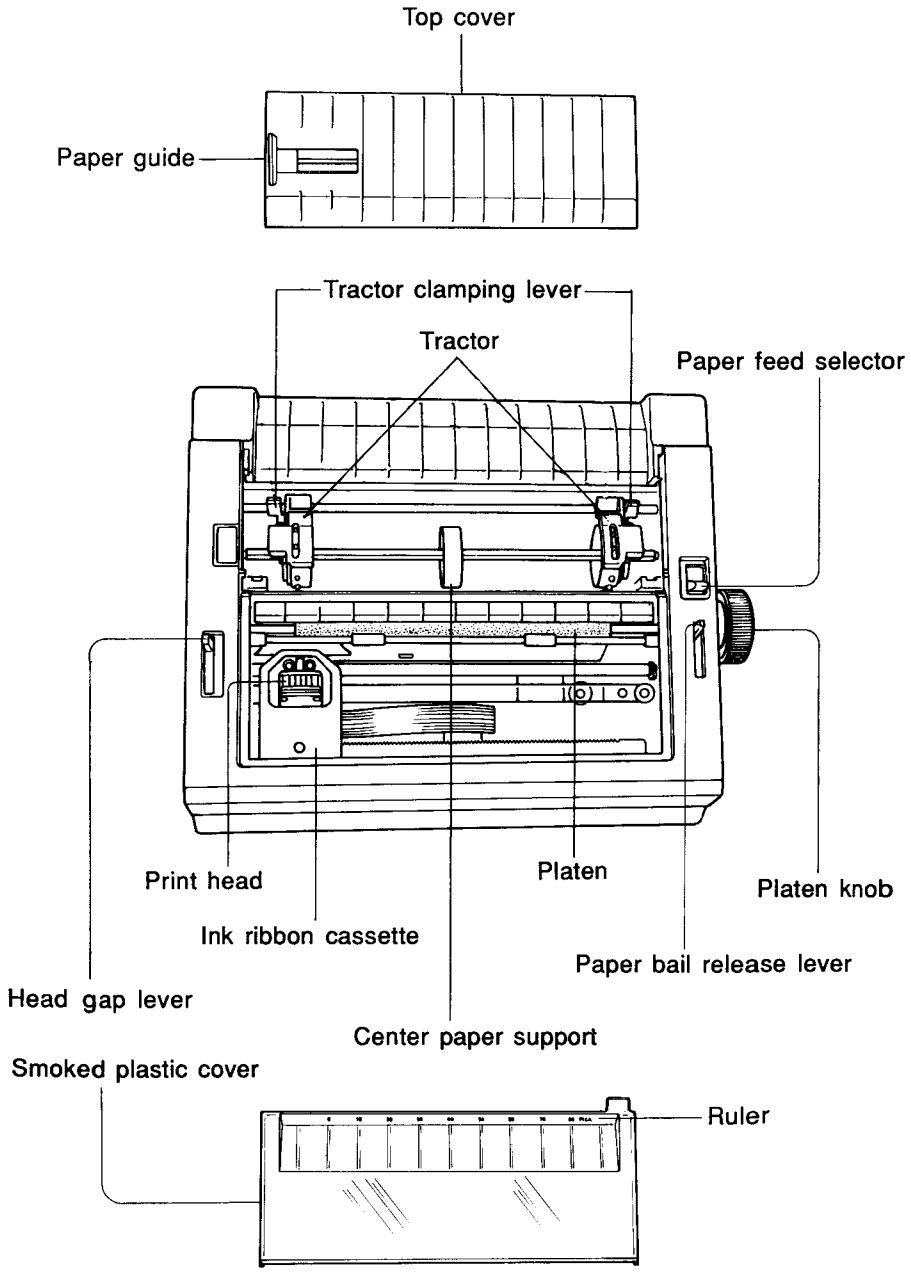
1.3 Names of the Parts

The Front View of the KX-P1180

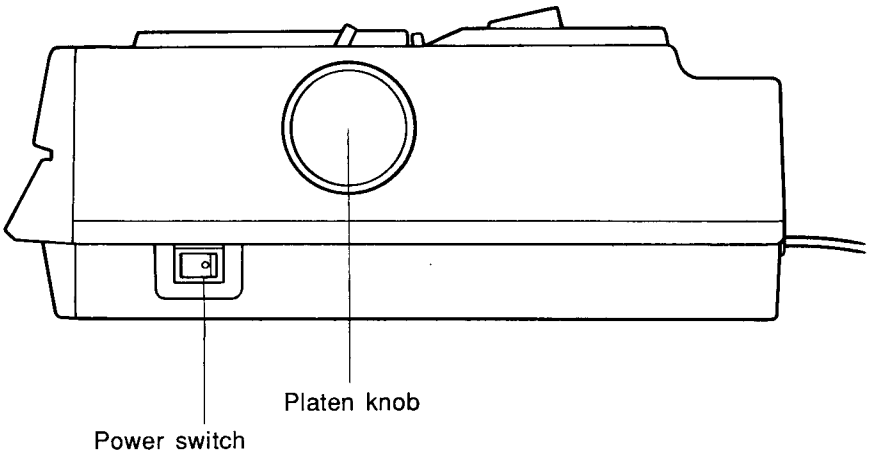


1

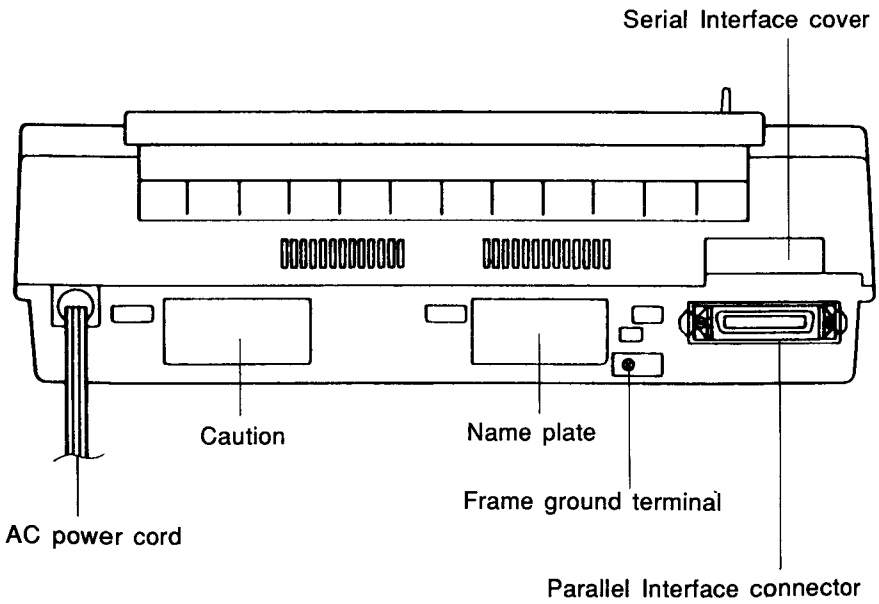
The Top View of the KX-P1180



The Right View of the KX-P1180



The Rear View of the KX-P1180



2. Set up

2.1 Site Requirements

2

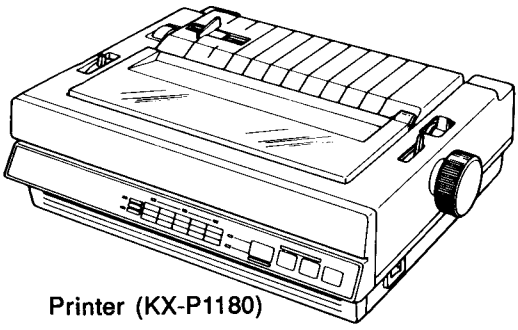
This printer can be installed in any normal office environment. No special wiring or cooling is required. However, a minimum of 4" (10 cm) clearance on all sides is necessary to insure proper ventilation. The printer should be placed on a flat horizontal surface away from a heater or other heat source. The printer should not be used in an excessively humid or dusty environment. The following table lists the operating requirements of the printer.

Line Voltage: Frequency:	} Refer to the nameplate located on the rear of the printer.
Temperature:	50~95°F (10~35°C)
Humidity:	30~80%

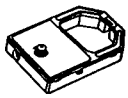
2.2 Unpacking and Inspection

Carefully open the shipping carton and remove the contents. Inspect the printer and accessories for damage. Report damage or shortages to the store from which the unit was purchased. You may have already seen the area inside the manual's front cover where you should record important information regarding the printer.

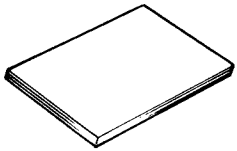
Please keep all the packing materials so that they may be used should you wish to transport the printer in the future. They are specifically designed to protect your printer during shipment.



Printer (KX-P1180)



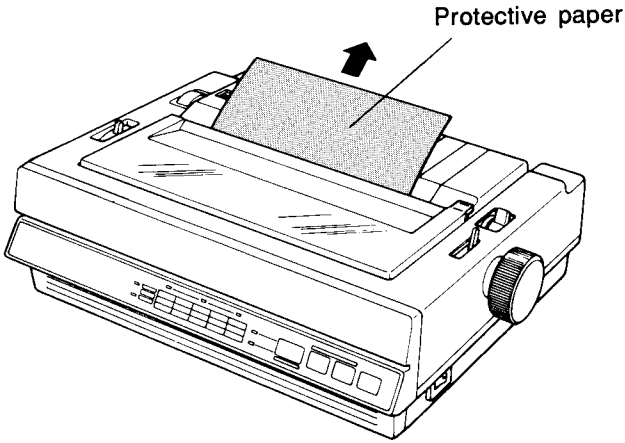
Ink ribbon cassette (KX-P115)



Operating manual

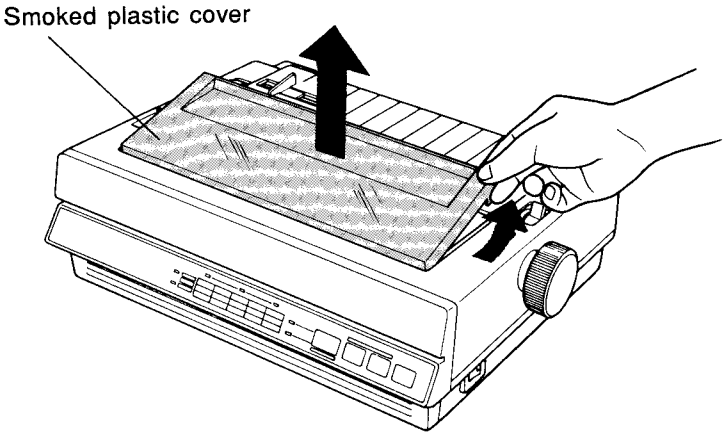
2.3 Initial Setup

Removing the Protective Paper (if installed) Around the Platen



Removing the Printer Cover

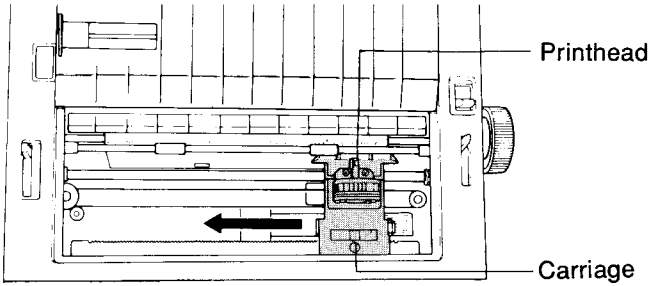
To remove the smoked plastic cover, lift the right side as shown below.



2

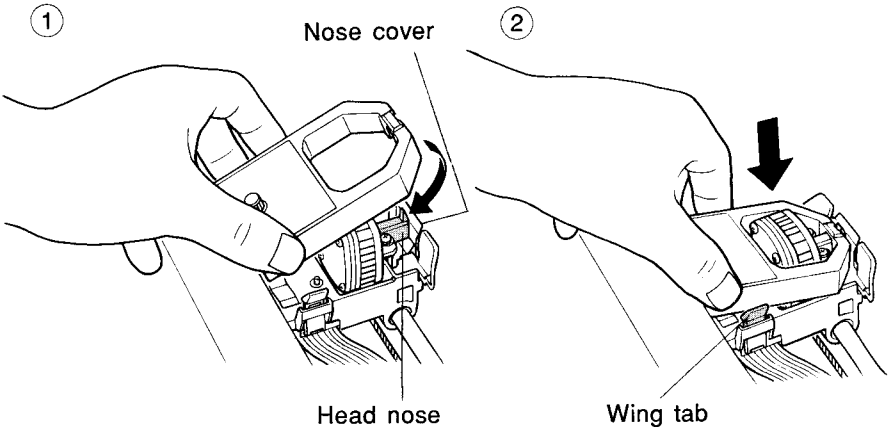
Mounting the Ribbon Cassette

(1) Make sure the printer is off. Gently slide the printhead carriage toward the center of the unit. Be sure the head gap lever is in the lower position (+).



(2) Prior to installing the cassette, remove any slack in the ribbon by rotating the knob on the cassette counterclockwise.

(3) Position the cassette over the carriage and lower it in place, inserting its rear end first as shown ①. Visually insure that the ribbon slips between the nose cover and the nose of the print head. Gently, but firmly press down on the cassette until the wing tab snaps into place ②.



(4) Set the head gap lever to the proper position. Refer to the Section 2.5 on next page.

Note:

- To remove the cassette, gently spread the wing tab and lift up the cassette.

2.4 Power Up

The power switch is located on the right side of the printer toward the front. It is used to turn the AC power ON or OFF. When the power is supplied to the printer, the power indicator light on the front panel will be lit.
The following procedures should be followed when turning the printer on:

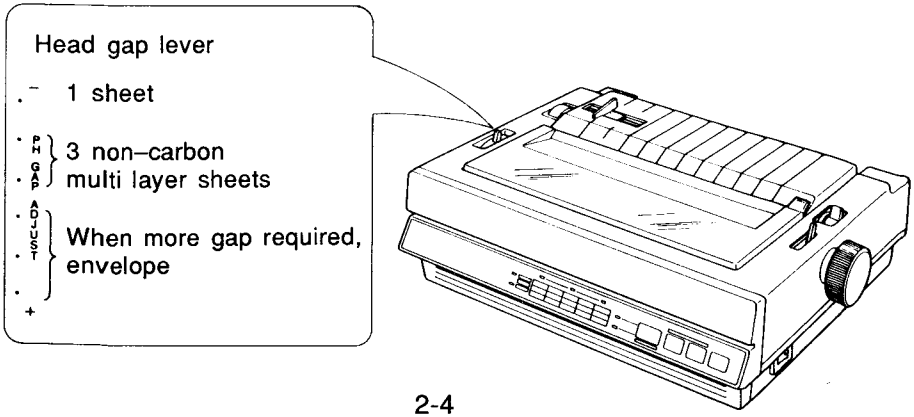
1. Be sure the ribbon is installed correctly.
2. Be sure the power cord is plugged into an outlet of the proper rating.
3. Turn the power ON.

2.5 Adjusting the Printing Head Gap

The distance between the printing head and platen can be adjusted to compensate for the thickness of the paper.

The 6-position head gap lever moves the printhead closer to or farther away from the platen approximately 0.0028 inch (0.07 mm) per step. To avoid the possibility of print head or ribbon damage, the head gap lever should normally be set to the upper position (–) when printing on single sheet paper. For thick paper or multi-part forms, move the lever toward the lower position (+). Maximum paper thickness is 0.013 inch (0.32 mm).

Note:
- If an ink smear occurs when loading paper or during printing, move the lever toward the lower position (+) until the smear no longer appears.



2.6 Paper Installation

The paper feed mechanism uses friction for single sheet paper or envelopes and tractors for continuous fanfold paper. Alternating between the two is accomplished by using the lever on the right side of the printer labeled "F" (friction) and "T" (tractor). In the friction mode the paper is held by pinch rollers which press the paper against the platen. The tractor mode is for use with continuous fanfold paper. You can insert the continuous fanfold paper from either the rear or bottom of the printer. Rear feeding allows continuous forms to be torn off without wasting a copy between printouts.

Single Sheet and Envelopes

To install a single sheet of paper or envelope, follow these procedures:

(1) Turn the power switch ON. The paper out indicator blinking.

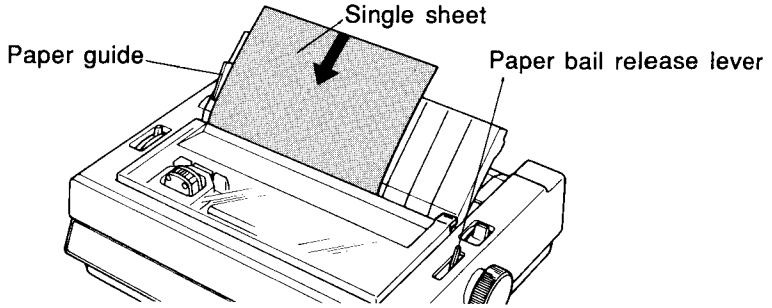
(2) Make sure that the head gap lever position is appropriate to the type of paper being used.

(3) Verify that the paper feed selecter in the "F" position.

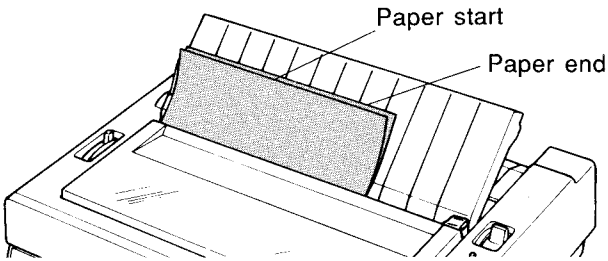
(4) Raise the top cover and insert the paper behind the platen. Use the markings and paper guide on the top cover as a guide. Keeping the left edge of the paper in line with the paper guide.

(5) Pull the paper bail release lever toward the front of the printer to wrap the paper automatically around the platen.

(6) Press down and hold the Line Feed switch (LF) or rotate the platen knob to advance the paper.



(7) To align the paper horizontally or vertically, set the PAPER FEED selector to the "T" position. This releases the pinch rollers and allows the paper to be positioned manually as required. Set the selector back to "F" before printing.



(8) Push the paper bail release lever toward the rear.

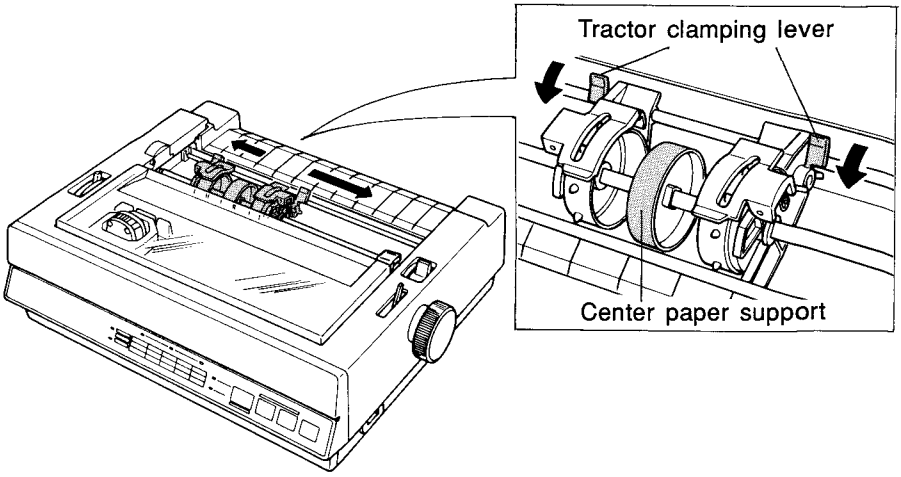
Continuous Fanfold Paper from Rear

The following steps describe how to load Continuous Fanfold Paper from the rear of the printer:

(1) Turn the power switch ON. The paper out indicator blinking.

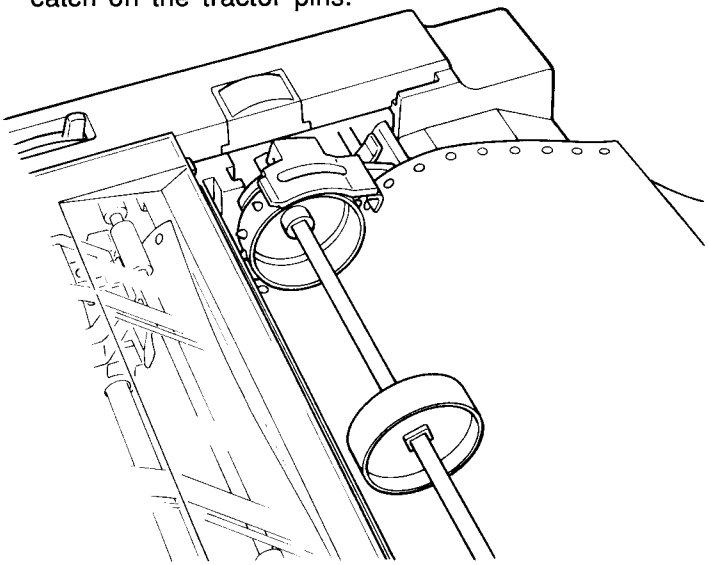
(2) Remove the top cover.

(3) Unlock the tractors by pulling up on the tractor clamping levers. Slide the tractors out toward the sides.



(4) Place the PAPER FEED selector in the "T" position.

(5) Insert the paper so that the sprocket holes align with and catch on the tractor pins.



(6) Rotate the platen knob to advance half-way around.

(7) Pull the paper bail release lever toward you.
The printer will rotate the paper about half-way around the platen.

(8) Press down and hold the Line Feed switch (LF) to advance the paper and stop the paper just before it reaches the smoked plastic cover.

(9) Center the paper horizontally using the ruler on the smoked plastic cover.

(10) Lock both tractor clamping levers by pushing them down.

(11) Push the paper bail release lever toward the rear.

(12) Rotate the platen knob in the reverse direction to adjust printing position.

(13) Replace the top cover.

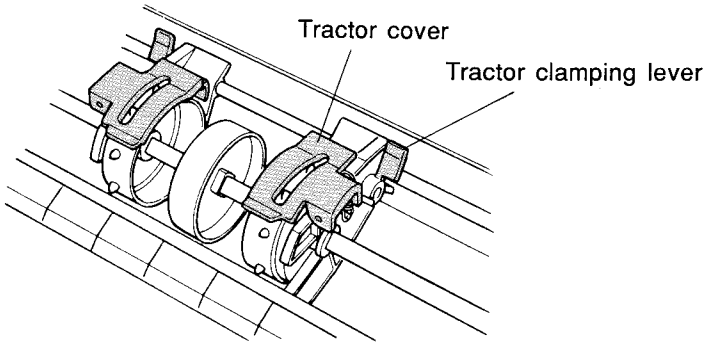
Continuous Fanfold Paper from Bottom

The following steps describe how to load continuous fanfold paper from the bottom of the printer:

(1) Turn the power switch ON. The paper out indicator blinking.

(2) Remove the top cover.

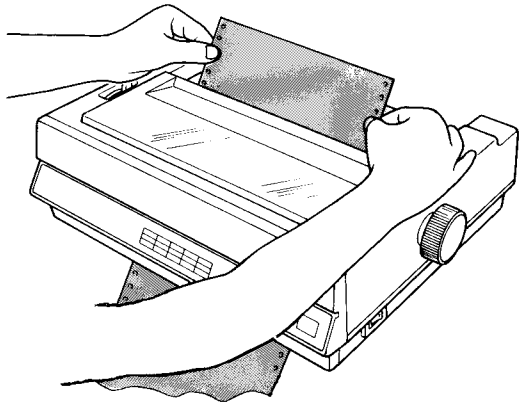
(3) Open both tractor covers.



(4) Place the paper feed selector in the "T" position and move the paper bail release lever toward you.

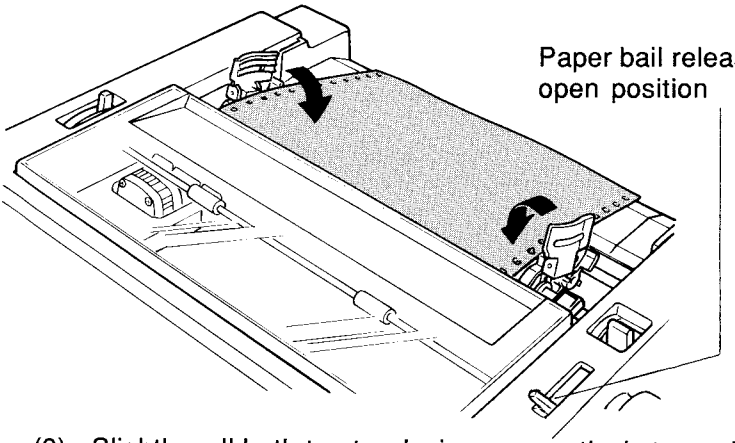
(5) Insert the paper from the bottom opening of the printer.

(6) Pull the paper until it reaches the tractor pins.



(7) Adjust the positions of the tractor devices in accordance with the width of the paper, unlock both tractors by pulling forward on the tractor clamp levers.

(8) Align the paper sprocket holes with the tractor pins and close the tractor covers.



(9) Slightly pull both tractor devices respectively toward the left or right direction to eliminate any slack in horizontal direction.

(10) Lock both tractor clamping levers by pushing them down.

(11) Slightly pull the paper from the bottom to eliminate any vertical slack.

(12) Visually ensure that the tractor pins are positioned properly in the sprocket holes.

(13) Replace the top cover.

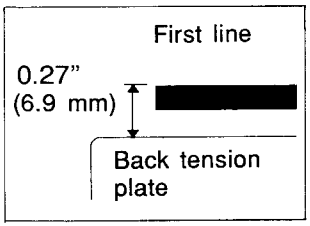
Note:

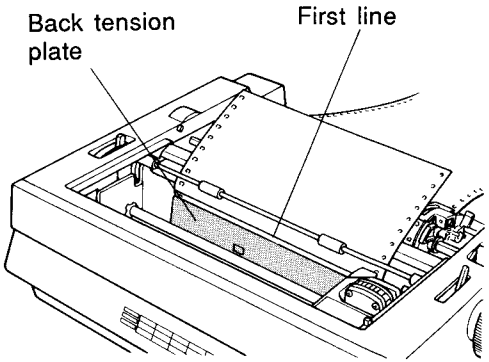
- When feeding paper from the bottom:
  - **To insure proper paper feeding, the paper bail release lever must be placed in the open position (ie: toward the front of the printer).**
  - If you use the functions accompanied with reverse feed, such as ESC+j, ESC+w (Standard Mode) and ESC+[+@ (IBM Mode) commands, the printer will not feed correctly and print out result may not be correct.

2.7 Aligning the Top of Form

The printer has a line counter which keeps track of the vertical position of the print head. Each time power is turned on, the line counter is reset and the current position of the head is designated as line one. This location is referred to as TOP OF FORM. A page is defined by setting the Control Table on the front panel or through the page length designation command. The first line of text will begin 0.27" (6.9 mm) from the top edge of the back tension plate.

To align the top of form, rotate the platen knob or use the LF switch or MICRO LINE FEED function (see Section 3.1), turn printer off, wait a moment, then turn printer on.





2.8 Self Test

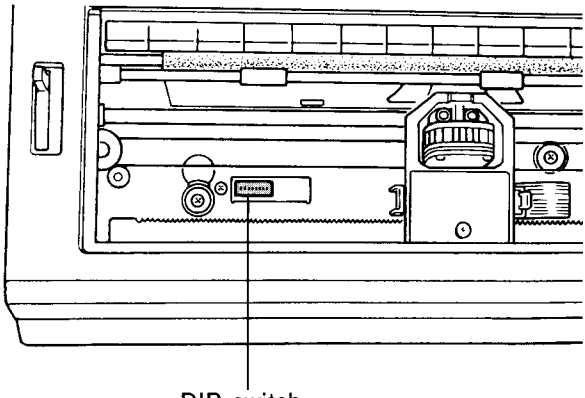
The printer has a self test feature which allows the user to test the printer independently. The mode is entered by turning on the power switch while pressing the LF switch. First, all ASCII characters will be printed in draft and all four NLQ fonts in 10 cpi. Then they will be printed in draft mode for approximately 15 minutes. To release the self test mode, turn the power switch off. It is also possible to print out a list of the current DIP switch settings, allowing the user to check the settings without moving the printer. This feature is activated by turning on the power while pressing the FF switch.

2.9 Connecting to Computer

The printer communicates with the computer through an interface cable. The printer has Centronics Parallel interface as standard. An additional RS-232C serial interface is available as an option. See section 7 "Interfacing" for detailed information.

2.10 DIP Switch Setting

Turn the power off before setting the DIP switches. The DIP switches allow the user to set certain operating conditions of the printer. The following figure shows the location of the switches and the following table is a summary of the switch settings.



The switch settings are read into memory on power up. These memory locations then contain an image of the switch settings. The computer can change switch settings by downloading new commands. The International character set, the skip perforation switches, etc., can be changed in this manner.

DIP Switch 1

SWITCH NUMBER	FUNCTION	ON	OFF	POSITION WHEN SHIPPED
SW1	Printer Mode	IBM Mode (Proprinter II)	Standard Mode (FX-86e/FX-800)	OFF
SW2	Skip Perforation	1 inch (25.4 mm) skip	No skip	OFF
SW3	Automatic LF	CR + LF	CR only	OFF
SW4	Cut Sheet Feeder (Option)	Installed	Not Installed	OFF
SW5	7/8 bit	7 bit	8 bit	OFF
SW6	Character Set	SW1=ON: See IBM Proprinter II Character Set Chart SW1=OFF: See International Character Set Chart		OFF
SW7				OFF
SW8				OFF

International Character Set

SW6	SW7	SW8	INTERNATIONAL CHARACTER SET
OFF	OFF	OFF	USA
ON	OFF	OFF	FRANCE
OFF	ON	OFF	GERMANY
ON	ON	OFF	ENGLAND
OFF	OFF	ON	DENMARK I
ON	OFF	ON	SWEDEN
OFF	ON	ON	ITALY
ON	ON	ON	SPAIN I

When DIP Switch 1 is ON (IBM Mode)

SWITCH NUMBER	FUNCTION	ON	OFF
SW6	Character Set	Set 2	Set 1
SW7	Automatic CR	Causes Auto CR on LF, VT, ESC+J	Prevents Auto CR on LF, VT, ESC+J
SW8	Zero font	Zero slash Ø	Zero 0

SW1 Printer Mode

ON IBM Mode
OFF Standard Mode
Each printer mode has the following character set.
IBM character sets are selected by SW6 when SW1 is set to ON.

Standard Mode

ASCII	= 96
Italic ASCII	= 96
International	= 32
Italic International	= 32

IBM Character Set 1

ASCII	= 96
Special Characters	= 95

IBM Character Set 2

ASCII	= 96
Special Characters	= 158

Refer to Appendix A for the character set charts.

SW2 Skip Perforation

ON A 3 line margin is skipped before and after the perforation between pages.
OFF Printing is continuous, NO margins along perforation.

The setting can be changed by software. Refer to page 6-34.

SW3 Automatic LF

ON A Line Feed command (LF) is added to each Carriage Return (CR).
OFF Carriage Return only.

SW4 Cut Sheet Feeder

ON = C.S.F. installed
OFF = C.S.F. not installed

This setting is effective only when the paper feed selector is in the "F" position and the cut sheet feeder option (KX-P37) is installed.

SW5 7/8 Bit Code Selection

ON = 7 BIT
OFF = 8 BIT

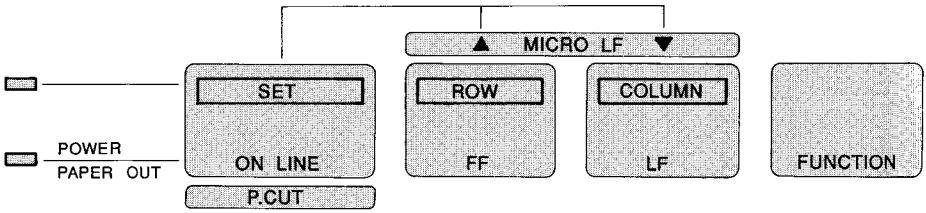
This switch selects the size of the data word. If the computer sends a 7 bit word, the printer must also be set for 7 bits. If the two settings do not agree, random errors will occur and meaningful communication will not be possible.

SW6, 7 & 8 Character Set

The combination of these switch settings is used with the SW1 setting to select one of 8 International character sets or IBM Modes. The character set diagrams are located in Appendix A.

The International character sets are selected when the SW1 is set to OFF.
The IBM Modes are selected when the SW1 is set to ON.

3.1 Front Panel Switches



ON LINE Switch

The ON LINE switch opens and closes the communication lines with the computer. When the power switch is turned on and paper is installed, the printer will power up in the ON LINE mode, and the ON LINE indicator light will be lit. The printer can be switched between the ON LINE and OFF LINE modes by pressing the ON LINE switch.
In the ON LINE mode, the printer is able to receive information from the computer and the ON LINE indicator will be lit. In the OFF LINE mode, the indicator light will be out and the printer can no longer receive data.

This switch is also used in the following functions:

1. **MICRO LINE FEED**
   In the OFF LINE mode or when the printer is not printing in the ON LINE mode, MICRO LINE FEED can be performed by pressing the LF or FF switch while pressing the ON LINE switch. (See LF and FF switch for detailed information.) This is very useful when setting Top of Form with custom forms.

2. **P. CUT**
   The PERFORATION CUT function can be performed with the FUNCTION switch.
   See page 3-3 "PERFORATION CUT" for detailed information.

LF (Line Feed) Switch

This switch is active in the OFF LINE mode and when the printer is not printing in the ON LINE mode. Pressing the LF switch will cause the paper to advance one line. Multiple line feeds can be performed by holding the switch down. If the print head is in the skip perforation area, (see Section 2.10 DIP Switch Setting for detailed information) the paper will advance to the top of the next page.

This switch is also used to allow the following function:

REVERSE MICRO LINE FEED
In the OFF LINE mode and when the printer is not printing in the ON LINE mode, REVERSE MICRO LINE FEED can be performed by pressing the LF switch while pressing the ON LINE switch.

FF (Form Feed) Switch

This switch is active in the OFF LINE mode and when the printer is not printing in the ON LINE mode. When you press the FF switch, the print head moves to the center and the paper is advanced from its current location to the top of the next page. Then a new top of form is established.

This switch is also used to allow the following function:

FORWARD MICRO LINE FEED
In the OFF LINE mode or when the printer is not printing in the ON LINE mode, FORWARD MICRO LINE FEED can be performed by pressing the FF switch while pressing the ON LINE switch.

FUNCTION Switch

This switch is an alternate switch and used in conjunction with the front panel switches to give them new functions. When this switch is activated, the ON LINE indicator starts blinking. In this mode the front panel switches have new functions as shown in the table below. Press the FUNCTION switch to return to normal mode.

See Section 3.2 "Function mode" for detailed information.

Panel Switch	Alternate Function
LF (COLUMN)	Advance the Control Table Column position
FF (ROW)	Advance the Control Table Row position.
ON LINE (SET)	Sets the Control Table position. PERFORATION CUT*

* P. CUT (PERFORATION CUT)

The PERFORATION CUT function can be performed with the printer in either OFF LINE or not printing in the ON LINE mode, by pressing the ON LINE switch after the FUNCTION switch. Additionally, the following conditions must be met.

–Paper feed selector is in the "T" position, and the paper is installed from rear.

–Printer is not accepting data in the receive buffer.

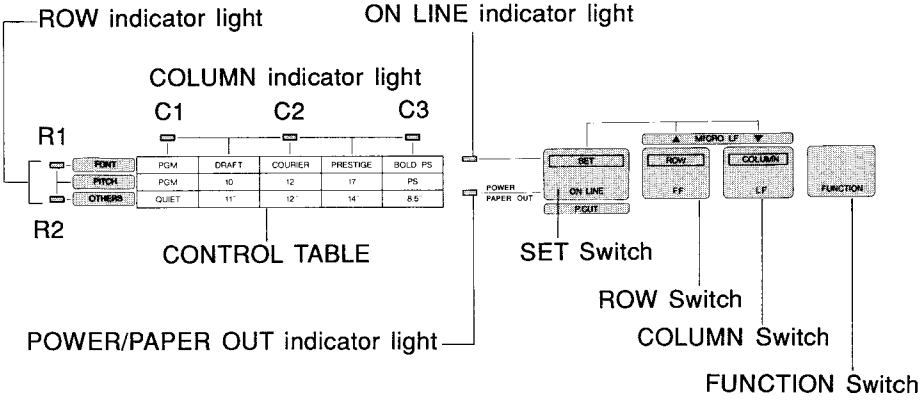
Pressing FUNCTION switch again resets the printer to the condition it was in before the FUNCTION switch was initially pressed.

Note:

- The PERFORATION CUT function is available only when the paper feed selector is in "T" position and the paper is installed from rear. If you install the paper from bottom with "T", the printer will not be able to accept the paper correctly.

3.2 Function Mode

To enter the Function mode, turn the power ON and press the FUNCTION switch. The ON LINE indicator will start blinking. In this mode, the front panel switches have new functions.



Setting the EZ-Set Operator Panel

ROW Switch (FF Switch)

In Function mode, pressing this switch will cause the Control Table's current row position to advance one row (shown by indicators R1, R2). This switch is usable in all modes except printing. Refer to the table below.

R1	R2	ROW	Selects type
ON	OFF	1st ROW	FONT
ON	ON	2nd ROW	PITCH
OFF	ON	3rd ROW	OTHERS

COLUMN Switch (LF Switch)

In Function mode, pressing this switch will cause the Control Table's current column position (shown by indicators C1 to C3) to advance to the next column.

SET Switch (ON LINE Switch)

In Function mode, pressing this switch sets the current Table position item.

Note:
- The FUNCTION switch is not usable when the printer is printing.

In the Function mode, the ROW indicator lights and COLUMN indicator lights on the front panel indicate the Control Table condition. The COLUMN indicator blinks to show the position of the function, and when SET is pressed, the column indicator lights continuously. When two of the COLUMN indicator lights are on at the same time, it designates the column between active lights, as shown in table below.

Selects type	ROW lights
FONT	R1 ON R2
PITCH	R1 ON R2 ON
OTHERS	R1 R2 ON

ON = ON
= OFF

COLUMN lights				
C1 C2 C3 ON	C1 C2 C3 ON ON	C1 C2 C3 ON	C1 C2 C3 ON ON	C1 C2 C3 ON
PGM*	DRAFT	COURIER	PRESTIGE	BOLD PS
PGM*	10cpi	12cpi	17cpi	P.S
QUIET	11"*	12"	14"	8.5"

(* Initial Setting when power is switched ON.)

Notes:
- COLUMN indicator lights will not reflect printer conditions set by software override.
- Quiet mode cannot be selected by software command.

Selecting the print Font

When the Control Panel is in the 1st ROW position, pressing the COLUMN switch will make the column position of font advance to the next position. After you adjust the column position to the desired font, press the SET switch to set it. Font selections through software commands are effective only when the printer is in PGM mode.

Selecting the print Pitch

When the Control Panel is in the 2nd ROW position, pressing the COLUMN switch will make the column position of pitch advance to the next position. After you adjust the column position to the desired pitch, press the SET switch to set it. Pitch selections though software commands are effective only when the printer is in the PGM mode.

Selecting the print Form Length

When the Control Panel is in the 3rd ROW position, pressing the COLUMN switch will make the column position of form length advances to the next position. After you adjust the column position to the desired length, press the SET switch to set it. The setting can be changed through software commands.

Setting/Releasing the Quiet mode

The Quiet mode is used to reduce lower the printing noise. When the Control Table is in the 3rd ROW position and the column position is in the quiet mode, the SET switch is an alternate action switch which sets and releases the Quiet mode. A blinking light indicates Quiet mode is not in effect.

MEMO LOAD

This printer can use single sheets, envelopes and continuous fanfold paper. You can insert a single sheet or envelope without removing the continuous paper:

1. First, tear off the printed pages of the continuous fanfold paper. Verify paper feed selector is in "T" position.
2. Turn the power ON and press the FUNCTION switch. The ON LINE indicator will start blinking. This indicates the printer is in Function mode.
3. Pull the paper bail lever toward you. The continuous fanfold paper will go back partway and stop. The ON LINE indicator will stop blinking and the printer automatically goes back to normal mode.
4. Move the paper feed selector to "F" position.
5. Raise the top cover and insert the single sheet behind the platen. Use the markings and paper guide on the top cover as a guide.
6. Pull the paper bail release lever toward far the front of the printer to wrap the paper automatically around the platen.
7. Press down and hold the Line Feed switch (LF) or rotate the platen knob to advance the paper.
8. To align the paper horizontally or vertically, set the PAPER FEED selector to the "T" position. This releases the pinch rollers and allows the paper to be positioned manually as required. Set the selector back to "F" before printing . Then push the paper bail release lever toward the rear.

Now you can print on the single sheet.

When printing on the single sheet is done, remove it by rotating the platen knob or pulling the paper bail release lever. Move the paper feed selector to "T" position and pull the paper bail release lever toward you to advance fanfold paper to the print start position.

3.3 Detectors

Out of Paper Detector

The out of paper detector is located under the platen and senses the absence of paper. When an out of paper condition occurs, printing stops, the printer goes to the OFF LINE mode, the PAPER OUT light starts blinking.To continue printing to the end of current page when out of paper condition occurs, press the ON LINE switch repeatedly until the page is completed. To start printing the next page, install new paper and press the ON LINE switch. The printer will resume printing.

Note:
- The out of paper detector can be disabled by a software command.

Overheat Detector

If the printer is printing continuously for extended periods of time, the print head may become overheated. When this occurs, an internal protective circuit will cause the printer to pause until the head temperature decreases sufficiently, at which time the printer will automatically resume printing without loss of data. This feature is included to extend the life of the print head.

3.4 Initialization

The printer is initialized under the following conditions:

the AC power is turned ON
the $\overline{\text{PRIME}}$ signal is received
the RESET command is received

When the printer is initialized, the following conditions are set:

- the print buffer is cleared
- the receive buffer is cleared (Except RESET PRINTER command)
- the download character buffer is cleared by a $\overline{\text{PRIME}}$ signal in Standard Mode. The download character buffer is not affected by $\overline{\text{PRIME}}$ in IBM Mode or RESET PRINTER command in Standard Mode.
- the DIP switches are read and printer modes set (Except RESET PRINTER command)
- horizontal tabs are set every 8 columns
- vertical tab settings are cleared
- all modes set by control and escape commands will be cleared (Except download font and NLQ selected by IBM Mode in $\overline{\text{PRIME}}$ signal)
- present form position is designated as top of form
- the Self Test mode is cleared
- the Control Table settings are read and set (Control Table settings are not changed by $\overline{\text{PRIME}}$ signal or RESET PRINTER command*)
- the print head goes to the home position (Except RESET PRINTER command)

* Some software packages send $\overline{\text{PRIME}}$ signal at the beginning of their programs. Print modes set by the Control Table will not change.

3.5 Hex. Dump

The Hex. Dump mode is activated by turning ON the power while pressing both the line feed (LF) and form feed (FF) switches. In this mode, all data received from the computer is printed in hex. code instead of the normal ASCII characters. Function codes for the printer (CR, LF, HT, etc.) are not executed. To reset the mode, turn the power OFF, then back on. This mode is very useful for debugging programs.

4. Software Introduction

4.1 Introduction

In order for a computer to communicate with a printer, both pieces of equipment must understand a common language or coding scheme. One such coding scheme is called ASCII (American Standard Code for Information Interchange). As an example, the ASCII code for the character "K" can be expressed in any of the following forms:

$(01001011)_2$–Binary
$4B_{HEX}$, $4B_H$–Hexadecimal
75_{DEC}, 75_D–Decimal

Many computers allow you to enter ASCII codes in hexadecimal form. Most computers which support ASCII allow the input to be in decimal form. Many allow you to enter the code in either form. Once entered, the ASCII codes are converted to binary form by the computer and then sent to the printer.

In the sections which follow, you will see how to enter various ASCII codes to enable the printer to perform the functions you would like. Since the decimal equivalent of the ASCII code is most commonly used, all examples which follow will use the decimal form.

Appendix A contains the ASCII character and control command tables used by this printer.

4.2 Control Codes

The various printer functions are set through the use of control codes, which consist of one or more ASCII characters entered into the computer in a special way. These control codes often differ from printer to printer. Control codes generally fall into two categories: one-byte control codes and multi-byte control codes. The multi-byte control codes are often referred to as Escape Sequences since each code begins with the ASCII code for the ESCAPE character (ESC). Such an ESC character should not be confused with the Escape Key found on some computer keyboards.

Control codes can be sent to this printer from your computer in different ways. The three most common ways are:

- Through commercial software packages
- Directly from the keyboard
- From within a user-written program

The latter two methods will specifically reference the BASIC language, although other languages such as FORTRAN, PASCAL, etc., can also be used. We will use BASIC since it is relatively easy to use. In addition it is a commonly used microcomputer language.

4.3 Entering Control Codes through Commercial Software Packages

Many computer users do not have the time, the expertise, or the interest to develop software suited for their applications. In such cases software written by professionals can be purchased. Such software should be selected not only to meet the needs of the user, but must also be compatible with both computer and printer.

Commercial software is often written with what is called a driver. A driver is that part of the software which allows the user to configure the package to the type of printer and interface being used. Once the software has been booted, the user is generally requested to supply additional information such as:

- Brand/Model of printer being used.
- I/O port being used (e.g.: LPT 1:)
- Baud rate, parity, etc. if a serial interface is being used.

Once the necessary information has been supplied, the software will provide the computer with the control codes and other data needed by this printer.

Many word processing packages will request that you enter the ASCII codes used by this printer for special settings such as underlining, compressed print, super-and subscript, italics, etc. In all cases you should refer to your software instruction manual for the proper use of the package with this printer.

4.4 Entering Control Codes Directly from the Keyboard

With many computers, the BASIC language is ready to use once you power up. With others, BASIC must be loaded from cassette or disk. In any case, once BASIC is ready, you may then enter these printer control commands directly from your computer keyboard.

BASIC requires the use of the PRINT command (or LPRINT, PRINT#, etc. depending on the type of BASIC your computer uses) to process and send the control commands to this printer. As part of this PRINT command, you must supply the appropriate ASCII code(s) for the CHR$ function.

For example, the command: **LPRINT CHR$(15)** followed by a **RETURN** will set this printer to compressed mode. Subsequent output to this printer will appear in compressed mode.

If, after issuing the above command, subsequent PRINT statements output nothing to the printer, check for one or more of the following:

- Have you indicated to the computer that output is to the printer and not the screen? For example, PR#1, causes subsequent PRINT statements on the Apple computer to PRINT to the printer and not the screen. LPRINT does the same in Microsoft BASIC.
- Is the printer on line? If not, press the green ON LINE button on the front panel.
- Is the interface cable plugged into the computer and printer?
- When using a serial interface, all settings (baud rate, protocol, etc.) on the printer the same as on the computer?

Notice that when you enter a BASIC command directly from the keyboard, you do NOT use a line number as you would in a BASIC program. Moreover, control codes may be entered only one line at a time.

4.5 Entering Control Codes from Within a Program

Control commands may also be entered from within a BASIC program. The advantage to this technique is that you can incorporate a number of different control commands into a single program and therefore produce output with a variety of special features. This is done by RUNning your program once. In this case BASIC requires that each line in your program be preceded by a line number.

As an example, we mentioned earlier that the command **LPRINT CHR$(15)** entered directly from the keyboard will set compressed print on this printer. From within a BASIC program, this command might be:

```
50 LPRINT CHR$(15)
```

Chapters will show you how to enter each of the control commands which this printer uses.

4.6 Entering Hexadecimal Code

In the event that you will be entering ASCII codes in hexadecimal form, you must supply two extra characters per code. These are the ampersand (&) and the letter H. The example below illustrates the BASIC command to set compressed print on this printer.

Decimal	Hexadecimal
LPRINT CHR$(15)	LPRINT CHR$(&H0F)

Refer to Appendix A.

4.7 Control Codes

A number of the printer control commands require only a single ASCII-coded character as part of the LPRINT statement. The command LPRINT CHR$(15) which we discussed earlier is an example of a single-byte control command.

Multi-byte control codes, often called Escape control codes or Escape sequences, always begin with an ESC designation. ESC is designated by CHR$(27) in decimal form or CHR$(&H1B) in hexadecimal form. The ESC designation is always followed by one or more additional codes, hence, the name multi-byte control code.

In BASIC, these two or more bytes are joined (or concatenated) into a single command or string using either a plus (+) sign, a semicolon (;), or by neither symbol but rather by listing one byte after another without any spaces. BASIC on many computers allows you to use any of these formats. Refer to your BASIC manual for the proper method of string concatenation.

The table on page 4-6 "Input Format" shows equivalent methods of entering multi-byte control commands for most computers.

There is one remaining input format commonly used to reduce the keystrokes necessary to enter a multi-byte control command. As you examine the multi-byte control commands in the pages ahead, you will notice that the second byte, with the exception of ESC+SO and ESC+SI, is always a character which appears somewhere on your keyboard. In such cases, rather than enter that character's ASCII code as part of the CHR$ function, you may simply enter that character in quotes ("). For example, to set pica pitch (ESC+P), you may enter:

```
LPRINT CHR$(27)+CHR$(80);
or
LPRINT CHR$(27)+"P";
```

As another example, to set double width printing, you may enter:

```
LPRINT CHR$(27)+CHR$(87)+CHR$(1);
or
LPRINT CHR$(27)+"W"+CHR$(1);
```

With this method, any of the three input formats shown in the following table may also be used (subject to the BASIC you are using).

	Two-Byte Command
Function **Name** **Code**	Set Pica Pitch ESC+P 27,80DEC
Input Format 1 **Input Format 2** **Input Format 3**	LPRINT CHR$(27)+CHR$(80); LPRINT CHR$(27);CHR$(80); LPRINT CHR$(27)CHR$(80);

	Three-Byte Command
Function **Name** **Code**	Set Double Width Printing ESC+W+1 27,87,1DEC
Input Format 1 **Input Format 2** **Input Format 3**	LPRINT CHR$(27)+CHR$(87)+CHR$(1); LPRINT CHR$(27);CHR$(87);CHR$(1); LPRINT CHR$(27)CHR$(87)CHR$(1);

Input Formats

This printer has two print modes. They are Epson FX-86e/FX-800 and IBM Proprinter II. Software commands of each mode are covered in the corresponding chapter.

4.8 Special Code for IBM PC series

Since LPRINT command on IBM PC generates LF together with CR, PRINT #1 instead of LPRINT is used to prevent this, and the following two lines of BASIC program are necessary at the top of a program. For details refer to your BASIC manual.

```
10 WIDTH "LPT1:", 255
20 OPEN "LPT1:" AS #1
```

PRINT #1 does not generate CR and LF, therefore a CR and LF must be used when they are required.

5. KX-P1180 Features

5.1 Print Feature Control

Print Quality and Font

This printer has a wide variety of print capabilities as show below. The user can select any print mode by combining them.

Quality	Font	Font Style	Pitch	Highlight
Draft		Superscript	10	Double height
NLQ	Courier	Subscript	12	Double width
	Bold PS	Italic	15**	Emphasize
	Prestige		17	Double strike
	Sans Serif*		20**	Underline
			PS	Overline***

* Available only through software command.
** Available in Standard Mode only through software; not available in IBM Mode.
*** Available only in IBM Mode.

This printer has two print quality levels: Draft and NLQ (Near Letter Quality). Which you choose depends on your need. Draft, printed at the fastest speed, is normally used for printing draft documents. NLQ produces the best print quality; it is used to print the final version of formal documents. The printer has four NLQ fonts: Courier, Bold PS, Prestige and Sans Serif and can be selected either by setting the Control Table on the EZ-Set Operator panel or through software. Super/subscript font characters are two-thirds the height of normal characters and are typically used in mathematical expressions, chemical formulae, and footnoting.

Character Pitch

This printer has six character pitches: 10 cpi (Pica), 12 cpi (Elite), 15 cpi (Micron), 17 cpi (Compressed), 20 cpi (Elite Compressed) and Proportional Spacing. The first five pitches are fixed pitch (within a pitch, all characters have the same width). In proportional spacing, character widths vary with the character. An "I", for example, takes up less space than as "M" or a "W". 15 cpi and 20 cpi modes are available only in Standard Mode.

(Print Example)

10 cpi printing (Pica)
12 cpi printing (Elite)
15 cpi printing (Micron)
17 cpi printing (Compressed)
20 cpi printing (Elite Compressed)
Proportional Spacing

Character Highlighting

This printer allows a document to have a variety of print styles through the mixing of fonts and pitches.

Double height printing makes the height of a character twice that of a normal one.

Double width printing makes the width of a character twice that of a normal one.

Double printing uses a double strike with two passes of the print head, feeding the paper 1/216" (0.12 mm) between the first and second pass. (In Standard Mode.)

Emphasized printing is done in one pass of the print head at half speed, which allows horizontally adjacent dots to be printed.

Underline printing produces a continuous line under characters, using the 9th pin of the print head.

Overline printing produces a continuous line over characters using the first pin of the print head. This is available only in the IBM Mode.

(Print Example)

Double Height
Double Width
Double printing
Emphasized Printing
Underline Overline Printing

5.2 Download Characters

If the printer does not contain all of the characters which you need, you can custom design up to 48 (2.0 KB) characters without the buffer option and up to 256 characters (18.0 KB) of both DRAFT and NLQ with the buffer option.

Standard Mode (Epson FX-86e/FX-800)

5

DRAFT FONT DOWNLOADING:

Download draft font.

Name: ESC+&+0+Cs+Ce+At+P_1+P_2+...+P_{11}
($0 \leqq Cs \leqq Ce \leqq 255$)

Dec.: 27, 38, 0, Cs, Ce, At, P_1, P_2,..., P_{11}

Hex.: 1B, 26, 00, Cs, Ce, At, P_1, P_2,..., P_{11}

Input Format: LPRINT CHR$(27)+"&"+CHR$(0)+CHR$(Cs)+CHR$(Ce)+CHR$(At)+CHR$(P_1)+CHR$($P_2$)+...+CHR$(P_{11})

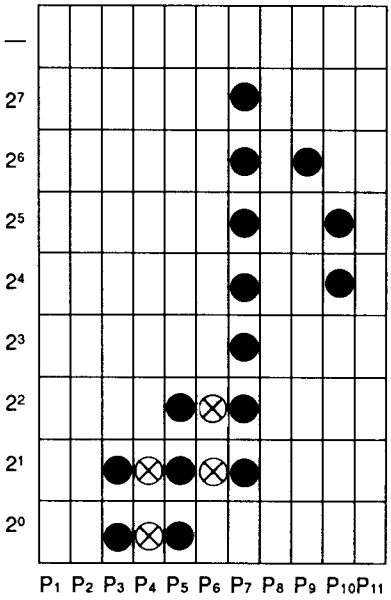
Example:

```
100 REM DEFINITION OF DOWNLOAD CHARACTERS IN DRAFT MODE
101 WIDTH "LPT1:",255
102 OPEN  "LPT1:" AS #1
110 PRINT #1,CHR$(27)+"&"+CHR$(0)+CHR$(65)+CHR$(66);
120 REM STORE IN PLACE OF "A" - ASCII CODE 65
130 PRINT #1,CHR$(170);
140 RESTORE 310
150 FOR I=1 TO 11
160    READ A : PRINT #1,CHR$(A);
170 NEXT I
180 REM STORE IN PLACE OF "B" - ASCII CODE 66
190 PRINT #1,CHR$(42);
200 RESTORE 310
210 FOR I=1 TO 11
220    READ A : PRINT #1,CHR$(A);
230 NEXT I
240 REM SELECT DOWNLOAD CHARACTER
250 PRINT #1,CHR$(27)+"%"+CHR$(1);
260 PRINT #1,"ABABABABABAB"+CHR$(10)+CHR$(10)
270 REM DOUBLE HEIGHT DOUBLE WIDTH PRINT
280 PRINT #1,CHR$(27)+"W1"+CHR$(27)+"w1"
290 PRINT #1,"ABABABABABAB"+CHR$(10);
291 CLOSE
300 END
310 DATA 0,0,3,3,7,6,254,0,64,48,0
```

♪♪♪♪♪♪♪♪♪♪♪

♪♪♪♪♪♪♪♪♪♪♪

Explanation:
To download a character into RAM, you must first design the character. You must quantify each dot column, P_1–P_{11}, by summing the powers of two represented by each dot. Consider the design of the musical note.



P_1 =0
P_2 =0
P_3 =3
P_4 =3
P_5 =7
P_6 =6
P_7 =254
P_8 =0
P_9 =64
P_{10} =48
P_{11} =0

5

Note: See page 5-7, 5th comment.

In our sample program lines 130~170, therefore, use the eleven values P_1–P_{11} (Program line 310 is data of P_1–P_{11}) to define the shape and size of the musical note using the upper 8 pins of the print head. Program lines 190–230 define the same shape and size, but for the lower 8 pins of the print head.

Next you must determine where in RAM the character(s) should be stored. The variables "Cs" and "Ce" are used for this purpose. The value specified for "Cs" indicates the ASCII location into which the starting downloaded character will be stored. The value specified for "Ce" indicates that ASCII location into which the ending downloaded character will be stored. If you are storing a single character, then Cs=Ce.

In our sample program, we created two musical note characters, one using the upper 8 pins of the print head, and the other using the lower 8 pins. These two distinct characters were stored in the ASCII locations where characters "A" and "B" are normally stored (see program line 110). Since "A" resides in ASCII location 65_{DEC} and "B" resides in ASCII location 66_{DEC}, the following program lines are equivalent.

```
110 LPRINT CHR$(27)+"&"+CHR$(0)+"AB";
          or
110 LPRINT CHR$(27)+"&"+CHR$(0)+CHR$(65)+CHR$(66);
```


Notice that Cs=65, Ce=66. Also note that CHR$(65)="A" and CHR$(66)="B".

We must next define the value of "At", which specifies the attribute information.

The illustration below shows the role of each bit in the specification of the attribute information. Attribute information is stored in one byte.

Bit NO.		Function
MSB	7	Bit=1: use upper 8 pins Bit=0: use lower 8 pins
	6 5 4	Derives print start (Ps) position for proportional spacing, $0 \leq Ps \leq 7$
	3 2 1	Derived print end (Pe) position for proportional spacing, $0 \leq Pe \leq 11$
LSB	0	Ps<Pe

Suppose we wish to create the character (musical note) in proportional spacing mode.

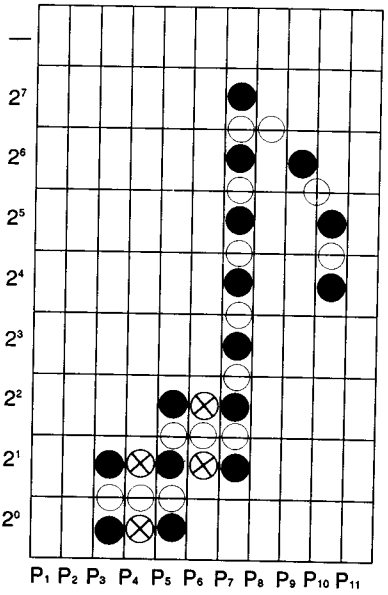
The values for Ps and Pe are derived from n and m (starting and ending print positions respectively) where Ps=n–1 and Pe=m–1. When printing characters from print column P_3 to P_{11} in proportional spacing mode, Ps=2=$(010)_2$ and Pe=10=$(1010)_2$. Thus, the attribute byte is as follows:

Bit No.	Binary Form	Function
MSB 7	0	Use lower 8 pins
6	0	Start of printing in column 3 (3–1)
5	1	
4	0	
3	1	End of printing in column 11 (11–1)
2	0	
1	1	
LSB 0	0	

We then set "At"=$2^1+2^3+2^5$=2+8+32=42.

Comments:

- When you select an NLQ font (COURIER, PRESTIGE, BOLD PS) through the Control Table, the printer will print draft download characters in NLQ mode, see below for detail.
- The downloadable draft font actually consists of 12 columns of dots, but P_{12} is always set to zero.
- Downloaded draft characters require 12 bytes per character:1 byte for attribute information and 11 bytes for the character design.
- Avoid continuous printing of download characters with high dot densities. 1 line has 8 pins × 11columns × 80 character dots (7040 dots/line). Keep the line density to 25% of maximum (1760 dots/line).
- In single height print mode, avoid using the same pin in two adjacent columns: otherwise, the pin in the second column of the pair will not be fired. In double height print mode, the musical note will print like the figure below. Pins will be fired in all the specified dot positions (● and ⊗) and the printer will add dots (○) automatically (see page 5-16, added dots for detailed information). If you select draft mode, specified dots (⊗) are not printed. However, you have to specify these dots (●) in order to print the character in double height mode or when NLQ is set from the Control Table.



NLQ FONT DOWNLOADING:

Defines near letter quality font.

Name: ESC+&+2+Cs+Ce+At+P_{1H}+P_{1L}+...+P_{23L}
($0 \leqq Cs \leqq Ce \leqq 255$)

Dec.: 27, 38, 2, Cs, Ce, At, P_{1H}, P_{1L},..., P_{23L}

Hex.: 1B, 26, 02, Cs, Ce, At, P_{1H}, P_{1L},..., P_{23L}

Input Format: LPRINT CHR$(27)+"&"+CHR$(2)+CHR$(Cs)+CHR$(Ce)+CHR$(At)+CHR$(P_{1H})+CHR$($P_{1L}$)+...+CHR$(P_{23L})

5

Example:

```
100 REM DEFINITION OF DOWNLOAD CHARACTERS IN NLQ MODE
101 WIDTH "LPT1:",255
102 OPEN  "LPT1:" AS #1
110 PRINT #1,CHR$(27)+"&"+CHR$(2)+CHR$(65)+CHR$(65);
120 REM STORE IN PLACE OF "A"  - ASCII CODE 65
130 PRINT #1,CHR$(11);
140 RESTORE 260
150 FOR I=1 TO 23*2
160    READ A : PRINT #1,CHR$(A);
170 NEXT I
180 REM SELECT DOWNLOAD CHARACTER
190 PRINT #1,CHR$(27)+"%"+CHR$(1);
200 PRINT #1,CHR$(27)+"x1";
210 PRINT #1,"AAAAAAAAAA"+CHR$(10)+CHR$(10);
220 REM DOUBLE HEIGHT DOUBLE WIDTH PRINT
230 PRINT #1,CHR$(27)+"W1"+CHR$(27)+"w1";
240 PRINT #1,"AAAAAAAAAA"+CHR$(10);
241 CLOSE
250 END
260 DATA 0,12,0,18,0,2,0,2,15,1,16,129,32,129,64,129
270 DATA 0,129,128,129,128,129,128,129,128,129,128,130
280 DATA 65,130,32,242,31,12,32,0,0,0,0,0,0,0,0,0,0,0
```

9999999999

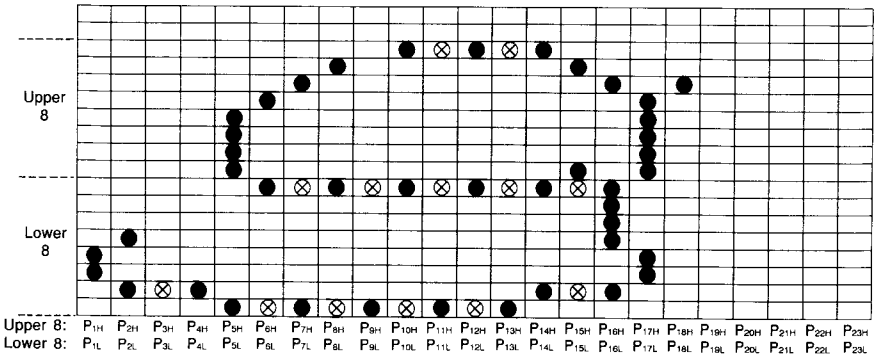
9999999999

Comment:

- This command is operational only when the 32k buffer option (KX-P43) is installed.

Explanation:

An NLQ font downloaded character uses 23 columns and 16 rows of dots. Since a given column contains 16 dots, each column is divided into 2 bytes. For example, column 1 is labeled P_{1H} for the upper 8 dots and P_{1L} for the lower 8 dots. Similarly, column 23 is labeled P_{23H} for the upper 8 dots and P_{23L} for the lower 8 dots. Column 24 is always set to zero; thus, we are working with P_{1H}–P_{23H} and P_{1L}–P_{23L}. Additionally, since each column contains 16 dots which overlap, the printing of an entire character is accomplished with two passes of the print head.


Upper
8
Lower
8
Upper 8: P1H P2H P3H P4H P5H P6H P7H P8H P9H P10H P11H P12H P13H P14H P15H P16H P17H P18H P19H P20H P21H P22H P23H
Lower 8: P1L P2L P3L P4L P5L P6L P7L P8L P9L P10L P11L P12L P13L P14L P15L P16L P17L P18L P19L P20L P21L P22L P23L

Then

P_{1H} =0	P_{13H} =128	P_{1L} =12	P_{13L} =129
P_{2H} =0	P_{14H} =128	P_{2L} =18	P_{14L} =130
P_{3H} =0	P_{15H} =65	P_{3L} =2	P_{15L} =130
P_{4H} =0	P_{16H} =32	P_{4L} =2	P_{16L} =242
P_{5H} =15	P_{17H} =31	P_{5L} =1	P_{17L} =12
P_{6H} =16	P_{18H} =32	P_{6L} =129	P_{18L} =0
P_{7H} =32	P_{19H} =0	P_{7L} =129	P_{19L} =0
P_{8H} =64	P_{20H} =0	P_{8L} =129	P_{20L} =0
P_{9H} =0	P_{21H} =0	P_{9L} =129	P_{21L} =0
P_{10H} =128	P_{22H} =0	P_{10L} =129	P_{22L} =0
P_{11H} =128	P_{23H} =0	P_{11L} =129	P_{23L} =0
P_{12H} =128		P_{12L} =129	

Program lines 130~170, therefore, use the values P_{1H}–P_{23H} and P_{1L}–P_{23L} to define the shape and size of the character using the lower 8 pins of the print head.

As shown in program line 110, this single character is stored in ASCII location 65, where the character "A" normally resides.

Downloading NLQ font characters requires 1 byte of attribute information which is input as the value of "At". Same as attribute information of draft font, refer to page 5-5 table.

The values Ps and Pe of NLQ attribute information are derived from n and m (starting and ending print positions respectively) using the equation Ps=(n–1)/2 and Pe=(m–1)/2. To ensure that Ps and Pe are integers, the character must be designed so that n and m are odd.

In this example, the g starts in column 1 and ends in column 23, and Ps=0=$(000)_2$ and Pe=11=$(1011)_2$. Thus, the attribute byte is as follows:

Bit No.	Binary Form	Function
MSB 7	0	Use lower 8 pins
6	0	Start of printing in column 1 (1–1)/2
5	0	
4	0	
3	1	End of printing in column 23 (23–1)/2
2	0	
1	1	
LSB 0	1	

We then set "At"=$2^3+2^1+2^0$=8+2+1=11
Refer to program line 130.

Comments:

- Downloaded NLQ font characters require 47 bytes per character: 1 byte for attribute information and 46 bytes for the character design.
- Refer to comments for single height print mode on page 5-7.

ROM CHARACTER GENERATOR SET COPY:

Copies internal ROM CG font into downloadable font area.

Name: ESC+:+0+0+0
Dec.: 27, 58, 0, 0, 0
Hex.: 1B, 3A, 00, 00, 00
Input Format: LPRINT CHR$(27)+":"+CHR$(0)+CHR$(0)+CHR$(0)

Example:

```
100 REM CHARACTER GENERATOR SELECTION
101 WIDTH "LPT1:",255
102 OPEN  "LPT1:" AS #1
110 REM ROM CG SET COPY TO DOWNLOAD BUFFER
120 PRINT #1,CHR$(27)+":"+CHR$(0)+CHR$(0)+CHR$(0);
130 REM DOWNLOAD TO "!" IN DRAFT FONT
140 PRINT #1,CHR$(27)+"&"+CHR$(0)+"!!";
150 PRINT #1,CHR$(11);
160 RESTORE 270
170 FOR I=1 TO 11
180    READ A : PRINT #1,CHR$(A);
190 NEXT I
200 REM SELECT DOWNLOAD CG
210 PRINT #1,CHR$(27)+"%"+CHR$(1);
220 PRINT #1,"SELECT DRAFT FONT DOWNLOAD CG !!!"+CHR$(10);
230 REM SELECT ROM CG
240 PRINT #1,CHR$(27)+"%"+CHR$(0);
250 PRINT #1,"SELECT DRAFT FONT ROM CG !!!"+CHR$(10);
251 CLOSE
260 END
270 DATA 0,0,3,3,7,6,254,0,64,48,0


SELECT DRAFT FONT DOWNLOAD CG ♪♪♪
SELECT DRAFT FONT ROM CG !!!
```

Comments:

- All ROM CG font in draft and NLQ modes are copied to the downloadable font area.
- Usable capacity of downloadable font does not decrease by using ROM CG set copying.
- Upon receipt of the command, all previous downloaded font will be changed to ROM CG font. The usable capacity of downloadable font returns to the initial state.
- When altering only part of the ROM CG, use this command before font downloading.

CHARACTER GENERATOR SELECTION:

Selects the character generator.

Name: ESC+%+n (n=0 or n=1)
Dec.: 27, 37, n
Hex.: 1B, 25, n

Comment:

- "n" specifies the CG mode.
  n=0: Resident (internal) CG
  n=1: Download CG

IBM Mode

In IBM mode there are many methods of printing down line loaded characters. The various methods are shown in the table below:

Print Method	Selection Command	Dot Columns
Draft Download	ESC+I+4	11 Max.
Draft Download 12 CPI High Speed	ESC+I+5	9 Max.
Text Download fonts	ESC+I+6	11 Max.*
NLQ Download fonts	ESC+I+7	23** (Prints in the same space as draft 11 columns)

* Text download fonts are derived from a Draft download matrix (the printer adds dots to create NLQ characters). Proportional spacing is supported.

** NLQ fonts print as designed (the printer does not add dots). Proportional spacing is not supported.

Draft and Text Character Downloading

Name: ESC+=+n_1+n_2+20+Cs+At_1+At_2+P_1+P_2+...+P_{11}
($0 \leqq Cs \leqq 255$)

Dec.: 27, 61, n_1, n_2, 20, Cs, At_1, At_2, P_1, P_2,..., P_{11}

Hex.: 1B, 3D, n_1, n_2, 14, Cs, At_1, At_2, P_1, P_2,..., P_{11}

n_1,n_2 indicate the number of bytes of character data to be loaded.

Total count=(total characters×13)+2 and n_2=integer portion of total count/256 and n_1=remainder.

For example, to find n_1 and n_2 for 32 characters:

Total count=(32×13)+2=418

$$256 \overline{)\,418}\quad 1$$
$$256$$
$$162$$

n_1=162, n_2=1

Note:
- If n_1=n_2=0 all download characters are cleared.
- 20 is a fixed number.

"Cs" indicates the first character position for loading characters. For example to load a character into the position occupied by the ASCII character "A", Cs=65

At_1 is attribute byte 1

Attribute byte 1 specifies:

Bit	
7	0 – Print using upper 8 pins 1 – Print using lower 8 pins
6-2	Ignored
1,0	00 – Normal character 01 – Line drawing character. The printer repeats the dots of row 8 in rows 9 to 12 as shown in Figure 1 on page 5-15. 10 – Shading character. The dots in rows 1 to 4 are repeated in rows 9 to 12 as shown in Figure 2 on page 5-15. NLQ mode is ignored 11 – Not supported

Note:
- Bit 7 of attribute byte 1 is effective only if bits 0, 1 are 00.

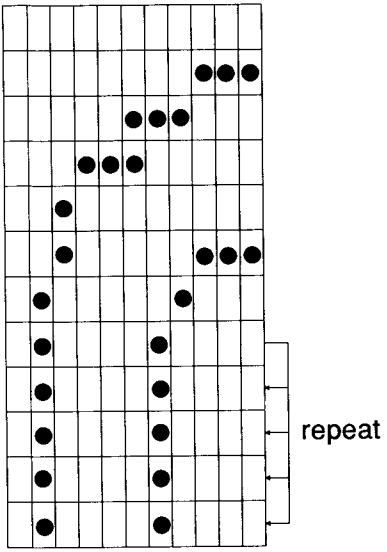


Figure 1

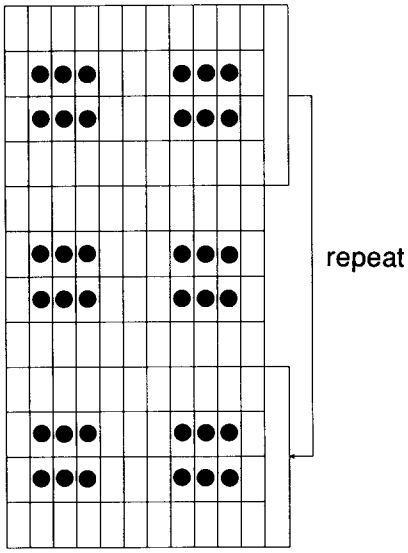


Figure 2

At_2 is attribute byte 2

Attribute byte 2 specifies proportional spacing information about the character:

Bit	
7	Reserved
6-4	Specifies the number of column data bytes to ignore (up to 7 leading columns can be ignored).
3-0	Specifies the total number of dot column to be printed. Each character includes a blank column which must be printed. This column is not included by bits 3-0, e.g. For a character 10 columns wide (9 printable+1 blank) bits 3-0 would be 1001. Widths specified greater than 11 are truncated to 11.

Note: To print all 11 columns, bits 6-0 may be set to 0.

Designing Draft and Text download characters.

When designing characters to print in both Draft and Text you should consider **how the printer adds dots to create NLQ characters**. The figures that follow show how the printer treats various situations. Black dots shown must be specified by the font design. Open circles represent dots that are automatically added by the printer in NLQ mode. Note horizontally adjacent dots specified in the font design do not print in draft mode.

Figure 1 illustrate how dots are added to vertical lines and how intersection of vertical and diagonal lines are treated. Figure 2 shows the intersection of two diagonal lines.

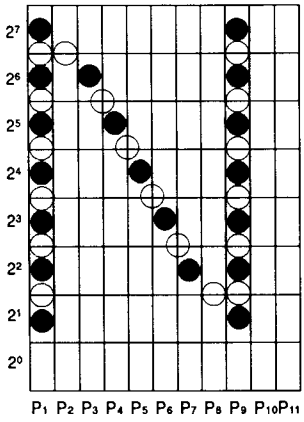


Figure 1

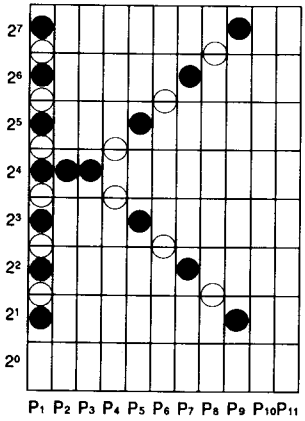


Figure 2

Figure 3 an example of the intersection of vertical and horizontal lines.

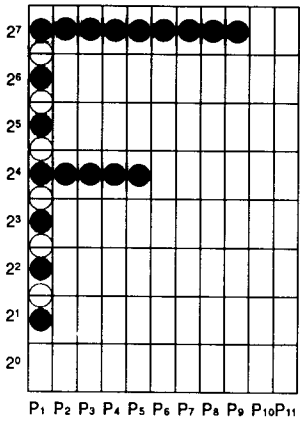


Figure 3

The intersection of diagonal and horizontal lines is printed out as two vertical dots, as shown in Figure 4.

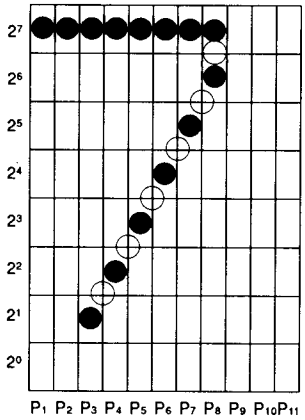


Figure 4

When you add the dots on a diagonal line, you can select the position of added dots as shown below.

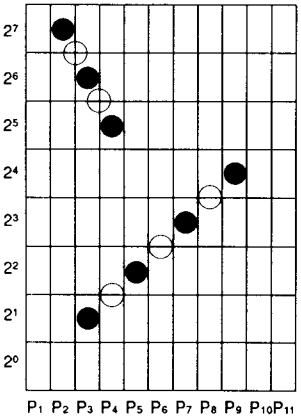
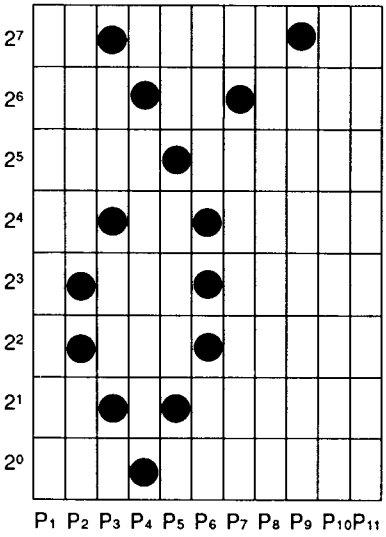


Figure 5

As an example we will provide a basic program that loads and print in draft mode, the greek gamma character shown below.



$P_1 = 0$
$P_2 = 2^2+2^3=4+8=12$
$P_3 = 2^1+2^4+2^7=2+16+128=146$
$P_4 = 2^0+2^6=1+64=65$
$P_5 = 2^1+2^5=2+32=34$
$P_6 = 2^2+2^3+2^4=4+8+16=28$
$P_7 = 2^6=64$
$P_8 = 0$
$P_9 = 2^7=128$
$P_{10} = 0$
$P_{11} = 0$

5

Example

```
100 REM DRAFT DOWNLOAD CHARACTER
101 WIDTH "LPT1:",255
102 OPEN  "LPT1:" AS #1
110 PRINT #1,CHR$(27)+"="+CHR$(15)+CHR$(0)+CHR$(20)+"A";
120 PRINT #1,CHR$(0)+CHR$(11);
130 RESTORE 240
140 FOR I=1 TO 11
150    READ A : PRINT #1,CHR$(A);
160 NEXT I
170 REM PRINT DRAFT DOWNLOAD
180 PRINT #1,CHR$(27)+"I"+CHR$(4);
190 PRINT #1,"A A A A A"+CHR$(10)+CHR$(13);
200 REM PRINT TEXT DOWNLOAD
210 PRINT #1,CHR$(27)+"I"+CHR$(6);
220 PRINT #1,"A A A A A"+CHR$(10)+CHR$(13);
221 CLOSE
230 END
240 DATA 0,12,146,65,34,28,64,0,128,0,0
```

NLQ FONT DOWNLOADING

Defines near letter quality font.

Name: ESC+=+n_1+n_2+21+Cs+At_1+At_2+P_{1H}+P_{1L}+...+P_{23L}
($0 \leq Cs \leq 255$)

Dec.: 27, 61, n_1, n_2, 21, Cs, At_1, At_2, P_{1H}, P_{2L},..., P_{23L}

Hex.: 1B, 3D, n_1, n_2, 15, Cs, At_1, At_2, P_{1H}, P_{2L},..., P_{23L}

Input Format: LPRINT CHR$(27)+"="+CHR$(n_1)+CHR$($n_2$)+
CHR$(21)+CHR$(Cs)+CHR$($At_1$)+CHR$(At_2)+
CHR$($P_{1H}$)+CHR$(P_{2L})+...+CHR$($P_{23L}$);

5

Example

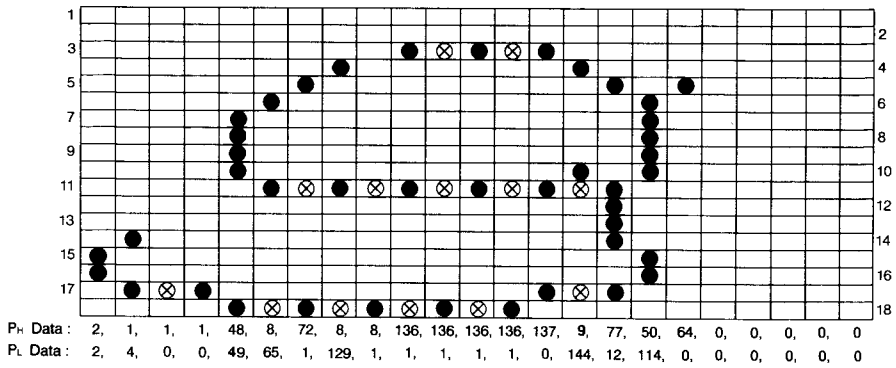
```
100 REM NLQ DOWNLOAD CHARACTER
101 WIDTH "LPT1:",255
102 OPEN  "LPT1:" AS #1
110 PRINT #1,CHR$(27)+"="+CHR$(50)+CHR$(0)+CHR$(21)+"A";
120 PRINT #1,CHR$(0)+CHR$(11);
130 RESTORE 210
140 FOR I=1 TO 23*2
150    READ A : PRINT #1,CHR$(A);
160 NEXT I
170 REM PRINT NLQ DOWNLOAD
180 PRINT #1,CHR$(27)+"I"+CHR$(7);
190 PRINT #1,"A A A A A"+CHR$(10)+CHR$(13);
191 CLOSE
200 END
210 DATA 2,2,1,4,1,0,1,0,48,49,8,65,72,1,8,129
220 DATA 8,1,136,1,136,1,136,1,136,1,137,0,9,144
230 DATA 77,12,50,114,64,0,0,0,0,0,0,0,0,0,0
```

9 9 9 9 9

Explanation:

An NLQ font download character uses 23 columns and 18 rows of dots. Column 24 is always blank. P_H specifies the contents of odd rows, P_L the even rows. Of the 18 rows of dots available for each character, only 16 can be printed for normal characters (not line draw or shading). If bit 7 of attribute byte 1 is 0, rows 1~16 will print; if it is set to 1, rows 3~18 will print.

NLQ font Downloading



NLQ downloading characters require 48 bytes per character. There are 2 bytes attribute information and 46 bytes for the character design.

Attribute information 1

Bit NO.	Function
7	0 – Normal character 1 – Descending character
6-2	Ignored
1,0	00 – Normal character print mode (no block graphic character) 01 – Line-drawing character The printer repeats the dots of row 15 in 17, 19, 21 and 23, row 16 in 18, 20, 22 and 24. 10 – Shading character The printer repeats the dots of row 1, 3, 5 and 7 on 17, 19, 21 and 23, row 2, 4, 6 and 8 on 18, 20, 22 and 24. 11 – Not supported

Attribute information 2 is reserved. Always set attribute 2 to zero.

5.3 Bit Image (Graphics)

The bit image (graphics) mode enables you to control the firing of each pin of the print head to create virtually any graphics design you desire.

Dot per inch density (dot resolution) refers to the number of dots which can be printed horizontally. This printer enables you to access a variety of dot densities through specific control commands. The various dot densities and corresponding control commands appear in table below.

Command	Function	Dot Density
ESC+K+n_1+n_2	Standard density designation	60
ESC+L+n_1+n_2	Double density designation	120
ESC+Y+n_1+n_2	Double speed, double density designation	120
ESC+Z+n_1+n_2	Quadruple density designation	240
ESC+*+m+n_1+n_2 (Standard Mode only)	8-Pin Mode Selection: m=0 (Standard) m=1 (Double) m=2 (Double speed, double density) m=3 (Quadruple density) m=4 m=5 m=6 m=7	 60 120 120 240 80 72 90 144
ESC+^+m+n_1+n_2 (Standard Mode only)	9-Pin Mode Selection: m=0 (Standard) m=1 (Double) m=2 (Double speed, double density) m=3 (Quadruple density) m=4 m=5 m=6 m=7	 60 120 120 240 80 72 90 144

Dot Resolution (Dots per inch)

Command	Function	Dot Density
ESC+?+n+m (Standard mode only)	Bit Image Mode Reassignment: n="K", "L", "Y", "Z" m=0 (Standard) m=1 (Double) m=2 (Double speed, double density) m=3 (Quadruple density) m=4 m=5 m=6 m=7	 60 120 120 240 80 72 90 144

Dot Resolution (Dots per inch)

As you can see, each graphics control command uses two bytes, n_1, and n_2, for the designation of the actual number of dots you want printed on a line. The data entered in your program must match this dot specification; if not, in all likelihood your graphics data will contain strange characters.

Determining the values of n_1, and n_2 can be accomplished in the following way. Assume that you want to print N dots on a line, where N is within the proper range for the dot density. Then the outcome of the division below yields the values n_1 and n_2.

$$\begin{array}{r} n_2 \\ 256 \overline{)\ N} \\ \underline{-256\times n_2} \\ n_1 \end{array}$$

Where n_2 is the integer quotient and n_1 is the remainder. For those users with a BASIC programming background, n_2=INT (N/256) and n_1=N–(256*n_2).

As an example, suppose we want to print 967 dots per line. Then:

$$\begin{array}{r} 3 \\ 256 \overline{)\ 967} \\ \underline{768} \\ 199 \end{array}$$

, so n_2=3 and n_1=199

8-Pin Bit Image Mode

Of the 9 pins in the print head, the 8-pin bit image graphics mode uses the upper eight pins only. Each pin corresponds to a power of two. By summing the powers of two corresponding to each of the pins you wish to fire, you will obtain a numerical value which instructs the printer to print one column of dots. Through such techniques in BASIC as looping, numerical values for each column on a line are input and processed. The result is one line of graphics.

Pin No.	Pins	8-Bit Interface	7-Bit Interface
1	•	2^7=128	Not used
2	•	2^6=64	2^6=64
3	•	2^5=32	2^5=32
4	•	2^4=16	2^4=16
5	•	2^3=8	2^3=8
6	•	2^2=4	2^2=4
7	•	2^1=2	2^1=2
8	•	2^0=1	2^0=1
9	•	Not used	Not used

As an example, suppose you want to fire pins 1, 2, 5 and 8 simultaneously. Then you compute the following sum:

Input Code =Pin 1 Code+Pin 2 Code+Pin 5 Code+Pin 8 Code
$=2^7+2^6+2^3+2^0$
=128+64+8+1
=201

Thus, the value 201 is entered in the CHR$ function in order to print a single column of dots resulting from firing pins 1, 2, 5 and 8.

For our final example, refer to the standard density designation in the table on page 5-21. This setting is given by ESC+K+n_1+n_2. Suppose you wish to print 100 columns of dots, where every column fires pins 1 and 8 only.

$$256 \overline{)\ 100}\ 0$$

$$100$$

, so n_2=0 and n_1=100

You first compute the values of n_1 and n_2.

Our control code ESC+K+n_1+n_2 now translates into:

```
LPRINT CHR$(27)+"K"+CHR$(100)+CHR$(0);
```

Next compute the code for firing pins 1 and 8 simultaneously:

Input Code =Pin 1 Code+Pin 8 Code
$=2^7+2^0$
=128+1
=129

Finally, we incorporate our two calculations into the following program. Note that lines 20 and 30 are necessary for the proper execution of this program on many IBM-compatible computers. Such BASIC statements suppress CR and LF codes and enable printing on a full line without unwanted "breaks". Programs which include statements such as lines 20 and 30 cannot use LPRINTs to print data. In such cases, PRINT# statements must be used. Line 90 is necessary to CLOSE all open files.

```
10 REM STANDARD DENSITY
20 WIDTH "LPT1:",255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"K"+CHR$(100)+CHR$(0);
50 FOR I=1 TO 100
60 PRINT #1,CHR$(129);
70 NEXT I
80 PRINT #1,CHR$(10);
90 CLOSE
100 END
```

9-Pin Bit Image Mode (Standard Mode only)

In the 9-pin bit image mode, all 9 pins of the printed head may be fired. The 9 pins in the print head are divided into two portions, the upper 8 pins and the bottom pin.

As in the 8-pin mode, the upper 8 pins correspond to powers of two, ranging from 2^0 to 2^7. The firing of one or more of these 8 pins represents 1 bytes of data. The 9th (bottom-most) pin represents an additional byte of data. When fired, it is represented by the value 2^7. When not fired, it is represented by the value 0. Together, these two bytes determine the dot configuration for a single column of graphics.

Pin No.	Pins	Interface	Byte
1	•	2^7=128	1
2	•	2^6=64	
3	•	2^5=32	
4	•	2^4=16	
5	•	2^3=8	
6	•	2^2=4	
7	•	2^1=2	
8	•	2^0=1	
9	•	2^7=128	2
		NOT USED	

As an example, suppose you want to fire pins 1, 2, 5, 8 and 9 simultaneously. Then you determine the following two values:

Byte 1: Input Code (n_1) = Pin 1 Code+Pin 2 Code+Pin 5 Code+Pin 8 Code
$=2^7+2^6+2^3+2^0$
=128+64+8+1
=201

Byte 2: Input Code (n_2) = Pin 9 Code
$=2^7$
=128

Thus, the two bytes for a single column of dots are entered as:
CHR$(201); CHR$(128);

Refer to the 9-pin standard density designation in the table on page 5-21. This setting is given by ESC+^+m+n_1+n_2, where m=0. Suppose you wish to print 100 columns of dots, where every column fires pins 1, 2, 5, 8 and 9 as above.

As in the 8-pin example on page 5-24, n_1=100 and n_2=0. Our control code ESC+^+m+n_1+n_2 now translates into:

LPRINT CHR$(27)+"^"+CHR$(0)+CHR$(100)+CHR(0);

If we incorporate this information into a program, we might have the following:


```
10 REM 9-PIN STANDARD DENSITY
20 WIDTH "LPT1:",255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"^"+CHR$(0)+CHR$(100)+CHR$(0);
50 FOR I=1 TO 100
60 PRINT #1,CHR$(201)+CHR$(128);
70 NEXT I
80 PRINT #1,CHR$(10);
90 CLOSE
100 END
```

6. Software Commands

This chapter covers the software commands for Standard and IBM Mode. The software commands are grouped into the following classifications:

Standard Mode (FX-86e/FX-800)

FONT SELECTION

Name	Function	Page
ESC+4	Selects Italic printing	6-10
ESC+5	Releases Italic printing	6-10
ESC+k+n	Selects Print font style	6-10
ESC+x+1	Selects NLQ font	6-11
ESC+x+0	Releases NLQ font	6-11
ESC+S+1	Selects subscript printing	6-12
ESC+S+0	Selects superscript printing	6-12
ESC+T	Releases sub/superscript printing	6-12

CHARACTER PITCH SELECTION

Name	Function	Page
ESC+P	Sets 10 cpi (pica pitch) printing	6-12
ESC+M	* Sets 12 cpi (elite pitch) printing	6-13
ESC+g	Sets 15 cpi (Micron) printing	6-13
SI	* Sets 17 cpi (compressed) printing	6-14
ESC+SI	* Sets 17 cpi (compressed) printing	6-14
DC2	Releases compressed printing	6-14
ESC+p+1	Sets proportional spacing	6-14
ESC+p+0	Releases proportional spacing	6-14
ESC+SP+n	Sets character dot spacing	6-15
ESC+!+n	Sets certain pitches based upon value of n	6-15

CHARACTER HIGHLIGHT SELECTION

Name	Function	Page
ESC+!+n	Sets highlighting based upon value of n	6-15
ESC+E	Sets emphasized printing	6-16
ESC+F	Releases emphasized printing	6-16
ESC+G	Sets double printing	6-16
ESC+H	Releases double printing	6-16

* When 12 cpi and compressed pitch are set simultaneously, subsequent output is printed in 20 cpi (160 characters per line).

SO	Sets single-line double width printing	6-17
DC4	Releases single-line double width printing	6-17
ESC+SO	Sets single-line double width printing	6-17
ESC+W+1	Sets double width printing	6-17
ESC+W+0	Releases double width printing	6-17
ESC+w+1	Sets double-high printing	6-17
ESC+w+0	Releases double-high printing	6-17
ESC+ – +1	Sets underlining	6-18
ESC+ – +0	Releases underlining	6-18

CHARACTER SET SELECTION

Name	Function	Page
ESC+R+n	Sets international character set	6-19
ESC+6	Selects IBM Character Set II	6-20
ESC+7	Selects IBM Character Set I	6-20
ESC+t+n	Selects alternate character set	6-21

BIT IMAGE (GRAPHICS) MODE SELECTION

Name	Function	Page
ESC+K+n_1+n_2	Sets standard density (480 dot/line)	6-22
ESC+L+n_1+n_2	Sets double density (960 dot/line)	6-22
ESC+Y+n_1+n_2	Sets double density/double speed (960 dot/line)	6-22
ESC+Z+n_1+n_2	Sets quadruple density (1920 dot/line)	6-22
ESC+*+m+n_1+n_2	Sets 8-pin bit image mode selection (480, 576, 640, 720, 960, 1152, 1920)	6-23
ESC+^+m+n_1+n_2	Sets 9-pin bit image mode selection (480, 576, 640, 720, 960, 1152, 1920)	6-23
ESC+?+n+m	Reassigns graphics mode density	6-24

PAPER FEED SELECTION — Amount

Name	Function	Page
ESC+0	Sets paper feed to 1/8 inch (3.2 mm)	6-24
ESC+1	Sets paper feed to 7/72 inch (2.47 mm)	6-25
ESC+2	Sets paper feed to 1/6 inch (4.2 mm)	6-25
ESC+A+n	Sets paper feed to n/72	6-25
ESC+3+n	Sets paper feed to n/216 inch	6-26

PAPER FEED SELECTION — Execution

Name	Function	Page
FF	Feeds paper to next top form position	6-27
LF	Feeds paper one line	6-27
ESC+J+n	Executes one-line paper feed of n/216 inch	6-28
ESC+j+n	Executes one-line reverse paper feed of n/216 inch	6-28

PAGE FORMAT CONTROL

Name	Function	Page
ESC+C+0+n	Sets page length in inches	6-29
ESC+C+n	Sets page length in lines	6-30
ESC+Q+n	Sets right margin	6-30
ESC+l+n	Sets left margin	6-31
ESC+a+0	Enables left alignment	6-32
ESC+a+1	Enables auto centering	6-32
ESC+a+2	Enables right alignment	6-32
ESC+a+3	Enables auto justification	6-33
ESC+N+n	Sets skip perforation	6-34
ESC+O	Releases skip perforation	6-34

TABULATION — Horizontal

Name	Function	Page
ESC+D+n_1+...+n_x+0	Sets horizontal tab	6-34
ESC+D+0	Releases horizontal tab	6-34
HT	Executes horizontal tab	6-35

TABULATION — Vertical

Name	Function	Page
ESC+B+n_1+...+n_x+0	Sets vertical tab	6-35
ESC+B+0	Releases vertical tab	6-35
VT	Executes vertical tab	6-36
ESC+/+n	Sets VFU channel	6-36
ESC+b+m+n_1+...+ n_x+0	Sets VFU tabulation	6-37
ESC+b+m+0	Releases VFU tabulation	6-37

CARRIAGE CONTROL

Name	Function	Page
BS	Prints, then backspaces one character	6-37
CR	Prints a line, then returns carriage	6-38
ESC+<	Sets one line unidirection print	6-38
ESC+U+1	Sets single direction printing	6-38
ESC+U+0	Releases single direction printing	6-38
ESC+s+1	Sets half speed printing	6-39
ESC+s+0	Releases half speed printing	6-39
ESC+\+n_1+n_2	Moves the printhead to a relative horizontal position	6-39
ESC+$+$n_1$+$n_2$	Moves the printhead to an absolute horizontal position	6-40

6

DATA CONTROL

Name	Function	Page
CAN	Clears data in buffer	6-40
DC1	Selects printer remotely	6-40
DC3	Deselects printer remotely	6-41
DEL	Deletes last printable character	6-41
ESC+>	Sets MSB on	6-42
ESC+=	Sets MSB off	6-42
ESC+#	Cancels MSB setting	6-42
ESC+I+1	Selects undefined code printing	6-43
ESC+I+0	Releases printing code from undefined code location	6-43

DOWNLOADABLE CHARACTER SELECTION

Name	Function	Page
ESC+&+0+Cs+Ce+ At+P_1+P_2+...+P_{11}	Defines download draft font	6-44
ESC+&+2+Cs+Ce+ At+P_{1H}+P_{1L}+...+P_{23L}	Defines download near letter quality font	6-44
ESC+%+n	Selects download CG	6-44
ESC+:+0+0+0	Copies internal CG font into download CG	6-45

MISCELLANEOUS

Name	Function	Page
ESC	First byte of multi-byte control codes	6-45
NUL	Last byte of certain multi-byte control codes	6-46
ESC+@	Initializes the printer	6-46
ESC+9	Enables paper-out detection	6-46
ESC+8	Disables paper-out detection	6-46
ESC+EM+n	Selects Cut Sheet Feeder	6-47

IBM Mode (Proprinter II)

FONT SELECTION

Name	Function	Page
ESC+k+n	Selects NLQ font	6-10
ESC+I+n	Selects font	6-11
ESC+G	Sets double strike printing	6-12
ESC+H	Releases double strike printing	6-12
ESC+S+1	Selects subscript printing	6-12
ESC+S+0	Selects superscript printing	6-12
ESC+T	Releases sub/superscript printing	6-12

CHARACTER PITCH SELECTION

Name	Function	Page
ESC+:	Sets 12 cpi (elite pitch) printing	6-13
SI	Sets 17 cpi (compressed) printing	6-14
ESC+SI	Sets 17 cpi (compressed) printing	6-14
DC2	Releases elite and compressed printing	6-14
ESC+P+1	Sets proportional spacing	6-15
ESC+P+0	Releases proportional spacing	6-15

CHARACTER HIGHLIGHT SELECTION

Name	Function	Page
ESC+E	Sets emphasized printing	6-16
ESC+F	Releases emphasized printing	6-16
SO	Sets single-line double width printing	6-17
DC4	Releases single-line double width printing	6-17
ESC+SO	Sets single-line double width printing	6-17
ESC+W+1	Sets double width printing	6-17
ESC+W+0	Releases double width printing	6-17
ESC+[+@+n_1+n_2+ m_1+m_2+m_3+m_4	Sets double-high printing	6-18
ESC+ – +1	Sets underlining	6-18
ESC+ – +0	Releases underlining	6-18
ESC+_+1	Sets overlining	6-19
ESC+_+0	Releases overlining	6-19

CHARACTER SET SELECTION

Name	Function	Page
ESC+6	Selects IBM Character Set II	6-20
ESC+7	Selects IBM Character Set I	6-20
ESC+\+n_1+n_2	Sets all character set (Continuous)	6-21
ESC+^	Sets all character set (Single)	6-21

BIT IMAGE (GRAPHICS) MODE SELECTION

Name	Function	Page
ESC+K+n_1+n_2	Sets standard density (480 dot/line)	6-22
ESC+L+n_1+n_2	Sets double density (960 dot/line)	6-22
ESC+Y+n_1+n_2	Sets double density/double speed (960 dot/line)	6-22
ESC+Z+n_1+n_2	Sets quadruple density (1920 dot/line)	6-22

PAPER FEED SELECTION — Amount

Name	Function	Page
ESC+0	Sets paper feed to 1/8 inch (3.2 mm)	6-24
ESC+1	Sets paper feed to 7/72 inch (2.47 mm)	6-25
ESC+2	Executes line spacing set by ESC+A	6-25
ESC+A+n	Sets paper feed to n/72	6-25
ESC+3+n	Sets paper feed to n/216 inch	6-26
ESC+5+1	Sets automatic line feed on	6-26
ESC+5+0	Sets automatic line feed off	6-26

PAPER FEED SELECTION — Execution

Name	Function	Page
FF	Feeds paper to next top of form position	6-27
LF	Feeds paper one line	6-27
ESC+J+n	Executes one-line paper feed of n/216 inch	6-28

PAGE FORMAT CONTROL

Name	Function	Page
ESC+C+0+n	Sets page length in inches	6-29
ESC+C+n	Sets page length in lines	6-30
ESC+X+n_1+n_2	Sets left and right margin	6-31
ESC+4	Sets top of form	6-33
ESC+N+n	Sets skip perforation	6-34
ESC+O	Releases skip perforation	6-34

TABULATION — Horizontal

Name	Function	Page
ESC+D+n_1+...+n_k+0	Sets horizontal tab	6-34
ESC+D+0	Releases horizontal tab	6-34
HT	Executes horizontal tab	6-35

TABULATION — Vertical

Name	Function	Page
ESC+B+n_1+...+n_k+0	Sets vertical tab	6-35
ESC+B+0	Releases vertical tab	6-35
VT	Executes vertical tab	6-36
ESC+R	Returns to default tabs	6-36

CARRIAGE CONTROL

Name	Function	Page
BS	Prints, then backspaces one character	6-37
CR	Prints a line, then returns carriage	6-38
ESC+U+1	Sets single direction printing	6-38
ESC+U+0	Releases single direction printing	6-38

DATA CONTROL

Name	Function	Page
CAN	Clears data in buffer	6-40
DC1	Selects printer remotely	6-40
ESC+Q+3	Deselects printer remotely	6-41

DOWNLOADABLE CHARACTER SELECTION

Name	Function	Page
ESC+=+n_1+n_2	Defines download draft font	6-45

MISCELLANEOUS

Name	Function	Page
ESC	First byte of multi-byte control codes	6-45
NUL	Last byte of certain multi-byte control codes	6-46
ESC+9	Enables paper-out detection	6-46
ESC+8	Disables paper-out detection	6-46

ITALIC FONT: (Standard Mode only)

Selects italic character printing.

Name:	Set: ESC+4	Release:	ESC+5
Dec.:	27, 52		27, 53
Hex.:	1B, 34		1B, 35

Comment:

- Italic characters in locations 160_{DEC}–254_{DEC} ($A0_{HEX}$-FE_{HEX}) are printed in place of characters in locations 32_{DEC}–126_{DEC} (20_{HEX}–$7E_{HEX}$).

NLQ FONT STYLE:

Selects NLQ font style.

Name:	ESC+k+n	(n=0, 1, 2, 3, 6)
Dec.:	27, 107, n	
Hex.:	1B, 6B, n	

Comments:

- The following values can be used.
  - n=0, 2: Courier font
  - n=1: Sans Serif
  - n=3: Prestige font
  - n=6: Bold PS font
- This command is operational only when the font is set to "PGM" on Control Table.
- This command is effective in near letter quality mode only.
- Initial setting is Courier.

NEAR LETTER QUALITY (NLQ) FONT:

(Standard Mode only)

Selects near letter quality font printing.

Name: ESC+x+n (n=0, 1)
Dec.: 27, 120, n
Hex.: 1B, 78, n

Comments:

- Near letter quality characters are printed with two passes of the print head. Therefore double printing by ESC+G is ineffective in near letter quality printing.
- Fonts are set as: n=0:Draft font, n=1:NLQ font
- This command is operational only when the Font is set to "PGM" in the Control Table.

PRINT MODE SELECT:

(IBM Mode only)

Selects the printing fonts and quality.

Name: ESC+I+n
Dec.: 27, 73, n
Hex.: 1B, 49, n

n=0: Internal Draft fonts.
n=1: Internal Draft 12cpi High Speed fonts.
n=2: Internal Sans Serif fonts. (IBM NLQ)
n=3: Internal NLQ fonts. (IBM NLQ II)
n=4: Download Draft fonts.
n=5: Download Draft 12 cpi High Speed fonts.
n=6: Download Text fonts. (IBM download NLQ)
n=7: Download NLQ fonts. (IBM download NLQ II)

Comments:

- When n=4, the second of two horizontal adjacent columns will not be fired. When n=6 (download Text font), all columns will be fired.
- This command is operational only when the FONT is set to "PGM" in the Control Table.
- When you select "n=3", initial setting is Courier and you can change font by ESC+k+n.
- Text Matrix is 18x9.

DOUBLE STRIKE PRINTING: (IBM Mode only)

Selects double strike printing.

Name:	Set:	ESC+G	Release:	ESC+H
Dec.:		27, 71		27, 72
Hex.:		1B, 47		1B, 48

Comment:

- In Draft mode, the printer prints Sans Serif (IBM NLQ) font. In NLQ mode, this command is inefective.

SUB/SUPERSCRIPT FONT:

Selects Sub/Superscript font with characters printed on the top/bottom half of the line. Characters are reduced to 1/2 their original height.

Name:	Set:	ESC+S+n (subscript: n=1) (superscript: n=0)	Release:	ESC+T
Dec.:		27, 83, n		27, 84
Hex.:		1B, 53, n		1B, 54

Comment:

- Sub/superscript characters are 1/2 normal height.

PICA PITCH: (Standard Mode only)

Sets printing to 10 characters per inch (80 characters per line).

Name:	ESC+P
Dec.:	27, 80
Hex.:	1B, 50

Comment:

- This command is operational only when the PITCH is set to "PGM" in the Control Table.

ELITE PITCH: (Standard Mode only)

Sets printing to 12 characters per inch (96 characters per line).

Name: ESC+M
Dec.: 27, 77
Hex.: 1B, 4D

Comments:
- This command is operational only when the PITCH is set to "PGM" in the Control Table.
- When 12 cpi and compressed pitch are set simultaneously, subsequent output is 20 cpi (160 characters per line).

ELITE PITCH: (IBM Mode only)

Sets printing to 12 characters per inch (96 characters per line).

Name:	Set:	ESC+:	Release:	DC2
Dec.:		27, 58		18
Hex.:		1B, 3A		12

Comment:
- This command is operational only when the PITCH is set to "PGM" in the Control Table.

MICRON PRINTING: (Standard Mode only)

Sets micron (15 characters per inch) printing. (120 characters per line)

Name: ESC+g
Dec.: 27, 103
Hex.: 1B, 67

Comments:
- This command is operational only when the PITCH is set to "PGM" in the Control Table.
- When micron and compressed are set simultaneously subsequent output is 15 cpi (120 cpl).

COMPRESSED PRINTING PITCH:

Sets printing to 17 characters per inch. (137 characters per line).

Name:	Set:	SI or ESC+SI	Release:	DC2
Dec.:		15 or 27, 15		18
Hex.:		0F or 1B, 0F		12

Comments:

(Standard Mode)

- This command is operational only when the PITCH is set to "PGM" in the Control Table.
- When 12 cpi and compressed pitch are set simultaneously, subsequent output is 20 cpi (160 characters per line).
- When 15 cpi and compressed pitch are set simultaneously, the compressed print setting is ineffective.
- If proportional spacing is set together with compressed printing, compressed printing is ineffective.

(IBM Mode)

- Issuing the Set compressed command causes subsequent output to print at 17 cpi; issuing a Release compressed command causes subsequent output to print at 10 cpi.

PROPORTIONAL SPACING: (Standard Mode only)

Sets proportional spacing between characters.

Name:	Set:	ESC+p+1	Release :	ESC+p+0
Dec.:		27, 112, 1		27, 112, 0
Hex.:		1B, 70, 01		1B, 70, 00

Comments:

- If proportional spacing is set together with compressed printing, compressed printing is ineffective.
- This command is operational only when the PITCH is set to "PGM" in the Control Table.

PROPORTIONAL SPACING: (IBM Mode only)

Sets proportional spacing between characters.

Name:	Set: ESC+P+1	Release:	ESC+P+0
Dec.:	27, 80, 1		27, 80, 0
Hex.:	1B, 50, 01		1B, 50, 00

Comment:

- This command is operational only when the PITCH is set to "PGM" in the Control Table.

6

CHARACTER DOT SPACING: (Standard Mode only)

Sets character dot spacing.

Name:	ESC+SP+n	(0≦n≦127)
Dec.:	27, 32, n	
Hex.:	1B, 20, n	

Comment:

- Sets the amount of dot space n/120 added to the right of each character. When setting 15 cpi (Micron printing) dot space is n/180.

PROGRAMMABLE PITCH/HIGHLIGHTING: (Standard Mode only)

Sets a combination of character pitch and/or highlighting.

Name:	ESC+!+n	(0≦n≦255)
Dec.:	27, 33, n	
Hec.:	1B, 21, n	

Comments:

- Example: n=49 (31_{HEX}) (bits 0,4 and 5 to "1") produces elite, double printing, double width.
- PS and compressed setting ignore compressed.

- Print modes correspond to the setting of each bit as illustrated below.

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
"1"	Under-lining	Italic	Double width	Double printing	Empha-sized	Com-pressed	PS	Elite
"0"	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Pica

EMPHASIZED PRINTING:

Sets printing to twice the original horizontal dot density.

Name:	Set:	ESC+E	Release:	ESC+F
Dec.:		27, 69		27, 70
Hex.:		1B, 45		1B, 46

Comment:

- Emphasized characters are printed at half speed (80 cps in draft pica pitch).

DOUBLE PRINTING: (Standard Mode only)

Sets double printing.

Name:	Set:	ESC+G	Release:	ESC+H
Dec.:		27, 71		27, 72
Hex.:		1B, 47		1B, 48

Comment:

- Double Printing prints each line of data with two passes of the printhead, feeding the paper 1/216" (0.12 mm) between the first and second pass.

DOUBLE WIDTH PRINTING-SINGLE LINE:

Sets double width (elongated) character printing for one line only.

Name:	Set:	SO or ESC+SO	Release: DC4 or ESC+W+0
Dec.:		14 or 27, 14	20 or 27, 87, 0
Hex.:		0E or 1B, 0E	14 or 1B, 57, 00

Comment:

- Single-line double width printing is released when:
  - –a LF, FF, or VT is executed.
  - –a CR is executed (IBM Mode only).
  - –the printer is initialized (Standard Mode only).
  - –DC4 or ESC+W+0 is executed.
  - –ESC+!+0 is executed (Standard Mode only).

DOUBLE WIDTH PRINTING:

Sets double width (elongated) character printing.

Name:	Set:	ESC+W+1	Release: ESC+W+0
Dec.:		27, 87, 1	27, 87, 0
Hex.:		1B, 57, 01	1B, 57, 00

Comment:

- Double width printing set by ESC+W+1 is only released by ESC+W+0 or ESC+!+0 (Standard Mode only).

DOUBLE HIGH PRINTING: **(Standard Mode only)**

Sets double high printing.

Name:	Set:	ESC+w+1	Release: ESC+w+0
Dec.:		27, 119, 1	27, 119, 0
Hex.:		1B, 77, 01	1B, 77, 00

Comments:

- Sub/Superscript and compressed modes are not valid with double high printing (10 and 12 cpi only).
- ESC+!+n can also be used to release double high printing (see Programmable Pitch for valid "n" values).

DOUBLE HIGH AND DOUBLE WIDTH PRINTING:

(IBM Mode only)

Sets printing to double high, double width or both at the same time.

Name: ESC+[+@+n_1+n_2+m_1+m_2+m_3+m_4
Dec.: 27, 91, 64, n_1, n_2, m_1, m_2, m_3, m_4
Hex.: 1B, 5B, 40, n_1, n_2, m_1, m_2, m_3, m_4

Comments:

- The values of n_1, n_2, m_1 and m_2 must be as follows:
  n_1=4, n_2=0, m_1=0, m_2=0
- The value of m_3 selects both the line feed and character height as follows:

m_3	Line feed	Char. height
0	Unchanged	Unchanged
1	Unchanged	Standard
2	Unchanged	Double-high
16	Single	Unchanged
17	Single	Standard
18	Single	Double-high
32	Double	Unchanged
33	Double	Standard
34	Double	Double-high

- The value of m_4 selects the character width as follows:
  m_4=1: Single–width
  m_4=2: Double–width

UNDERLINING:

Sets continuous underlining of characters.

Name: Set:	ESC+ – +1	Release: ESC+ – +0
Dec.:	27, 45, 1	27, 45, 0
Hex.:	1B, 2D, 01	1B, 2D, 00

Comment:

- Bit image data, spaces set by the HT code and IBM Graphic characters are not underlined.

OVERLINING: (IBM Mode only)

Sets continuous overlining of characters.

Name:	Set: ESC+_+1	Release:	ESC+_+0
Dec.:	27, 95, 1		27, 95, 0
Hex.:	1B, 5F, 01		1B, 5F, 00

Comment:

- Bit image data, spaces set by the HT code, IBM 12-dot special characters are not overlined.

6

INTERNATIONAL CHARACTER SET: (Standard Mode only)

Selects any one of 13 international character sets.

Name:	ESC+R+n	(0≦n≦12)
Dec.:	27, 82, n	
Hex.:	1B, 52, n	

Comments:

- Values of "n" are follows:

n=0: USA	n=7: SPAIN I
n=1: FRANCE	n=8: JAPAN
n=2: GERMANY	n=9: NORWAY
n=3: ENGLAND	n=10: DENMARK II
n=4: DENMARK I	n=11: SPAIN II
n=5: SWEDEN	n=12: LATIN AMERICA
n=6: ITALY	

- Appendix A illustrates allocation of international characters to their respective locations.
- International character sets can be set with DIP switches.

IBM CHARACTER SET I:

Selects IBM Mode (Character Set 1).

Name: ESC+7
Dec.: 27, 55
Hex.: 1B, 37

Comments:
- Refer to Appendix A.

(Standard Mode)
- This command is operational only when IBM Graphics is selected by ESC+t+1.

IBM CHARACTER SET II:

Selects IBM Mode (Character Set 2).

Name: ESC+6
Dec.: 27, 54
Hex.: 1B, 36

Comments:
- Refer to Appendix A.

(Standard Mode)
- This command is operational only when IBM Graphics is selected by ESC+t+1.

ALL CHARACTER CHART PRINTING (Continuous): (IBM Mode only)

Prints continuously from All Character chart.

Name: ESC+\+n_1+n_2
Dec.: 27, 92, n_1, n_2
Hex.: 1B, 5C, n_1, n_2

Comments:
- This command allows the printing of all characters including those with an ASCII value in the range decimal 0~32, 128~159.
- Refer to IBM All character chart. (Appendix A).
- The values specified for n_1 and n_2 indicate how many characters to print from All character chart, calculating the total count with this formula; Total count=n_2×256+n_1.

ALL CHARACTER CHART PRINTING (Single): (IBM Mode only)

Prints single character from All Character chart.

Name: ESC+^
Dec.: 27, 94
Hex.: 1B, 5E

Comments:
- Only the next character following this command will be printed as a character from the All Character chart.
- Refer to IBM All character chart (Appendix A).

ALTERNATE CHARACTER SET: (Standard Mode only)

Selects alternate character set.

Name: ESC+t+n (n=0, 1)
Dec.: 27, 116, n
Hex.: 1B, 74, n

Comments:
- The following values of n can be used.
  n=0: Italic
  n=1: Standard Graphic character set
- Refer to Appendix A.

STANDARD DENSITY GRAPHICS:

Sets standard density graphics mode (480 dots per line/60 dots per inch (25.4 mm)).

Name: ESC+K+n_1+n_2+Data
Dec.: 27, 75, n_1, n_2, Data
Hex.: 1B, 4B, n_1, n_2, Data

DOUBLE DENSITY GRAPHICS:

Sets double density graphics mode (960 dots per line/120 dots per inch (25.4 mm)).

Name: ESC+L+n_1+n_2+Data
Dec.: 27, 76, n_1, n_2, Data
Hex.: 1B, 4C, n_1, n_2, Data

DOUBLE SPEED, DOUBLE DENSITY GRAPHICS:

Sets double speed, double density graphics mode (960 dots per line/120 dots per inch (25.4 mm)).

Name: ESC+Y+n_1+n_2+Data
Dec.: 27, 89, n_1, n_2, Data
Hex.: 1B, 59, n_1, n_2, Data

Comment:
- Horizontally adjacent dots cannot be printed.

QUADRUPLE DENSITY GRAPHICS:

Sets quadruple density graphics mode (1920 dots per line/240 dots per inch (25.4 mm)).

Name: ESC+Z+n_1+n_2+Data
Dec.: 27, 90, n_1, n_2, Data
Hex.: 1B, 5A, n_1, n_2, Data

Comment:
- Horizontally adjacent dots cannot be printed.

8-PIN BIT IMAGE MODE SELECTION:

(Standard Mode only)

Selects one of eight 8-pin bit image graphic modes.

Name: ESC+*+m+n_1+n_2+Data (0≦m≦7)
Dec.: 27, 42, m, n_1, n_2, Data
Hex.: 1B, 2A, m, n_1, n_2, Data

Comments:

- Values of mare as follows:

m	Mode	Dot Density
0	Standard density	480 dpl/60 dpi
1	Double density	960 dpl/120 dpi
2	Double speed, double density	960 dpl/120 dpi
3	Quadruple density	1920 dpl/240 dpi
4	CRT I	640 dpl/80 dpi
5	Plotter	576 dpl/72 dpi
6	CRT II	720 dpl/90 dpi
7	Double–density plotter	1152 dpl/144 dpi

- Both the vertical and horizontal dot pitches in the 576 dot density mode equal 1/72 inch (0.35 mm), thereby producing a 1:1 aspect ratio.
- The following settings are equivalent:
  - –ESC+K+n_1+n_2+Data and ESC+*+0+n_1+n_2+Data
  - –ESC+L+n_1+n_2+Data and ESC+*+1+n_1+n_2+Data
  - –ESC+Y+n_1+n_2+Data and ESC+*+2+n_1+n_2+Data
  - –ESC+Z+n_1+n_2+Data and ESC+*+3+n_1+n_2+Data
- See page 5-22 for the determination of n_1 and n_2.

9-PIN BIT IMAGE MODE SELECTION:

(Standard Mode only)

Selects one of eight 9-pin bit image graphic modes.

Name: ESC+^+m+n_1+n_2+Data
Dec.: 27, 94, m, n_1, n_2, Data
Hex.: 1B, 5E, m, n_1, n_2, Data

Comments:

- See 8-Pin Bit Image (above) for values of "m".
- See page 5-25 for the determination of n_1 and n_2.

BIT IMAGE MODE REASSIGNMENT:

(Standard Mode only)

Reassigns bit image graphics mode density.

Name: ESC+?+n+m+Data
(n=75, 76, 89, 90 m=0, 1, 2, 3, 4, 5, 6, 7)
Dec.: 27, 63, n, m, Data
Hex.: 1B, 3F, n, m, Data

Comments:

- The value of "n" specifies the graphics mode which is to be reassigned:
  - n=75: Reassign Standard density (ESC+K+n_1+n_2)
  - n=76: Reassign Double density (ESC+L+n_1+n_2)
  - n=89: Reassign Double speed, Double density (ESC+Y+n_1+n_2)
  - n=90: Reassign Quadruple density (ESC+Z+n_1+n_2)
- The value of "m" specifies the graphics mode to which the original is to be reassigned:
  - m=0: Reassign to Standard density
  - m=1: Reassign to Double density
  - m=2: Reassign to Double speed, Double density
  - m=3: Reassign to Quadruple density
  - m=4: Reassign to CRT I
  - m=5: Reassign to Plotter
  - m=6: Reassign to CRT II
  - m=7: Reassign to Double–density plotter
- Refer to table on page 5-21 and 5-22 for details on the various bit image densities.

1/8 INCH PAPER FEED:

Sets paper feed amount to 1/8 inch (3.2 mm).

Name: ESC+0
Dec.: 27, 48
Hex.: 1B, 30

7/72 INCH PAPER FEED:

Sets paper feed amount to 7/72 inch (2.47 mm).

Name: ESC+1
Dec.: 27, 49
Hex.: 1B, 31

1/6 INCH PAPER FEED:

Sets paper feed amount to 1/6 inch (4.23 mm).

Name: ESC+2
Dec.: 27, 50
Hex.: 1B, 32

Comments:

- ESC+2 sets 1/6 inch paper feed in Standard Mode only.
- Use ESC+A+n, n=12, to set 1/6 inch paper feed and use ESC+2 to activate the ESC+A+n setting in the IBM Mode. The IBM Mode defaults to 1/6 inch.

---

n/72 INCH PAPER FEED:

Sets programmable paper feed amount to n/72 inch.

Name: ESC+A+n ($0 \leq n \leq 85$)
Dec.: 27, 65, n
Hex.: 1B, 41, n

Comments:

- In IBM Mode only, ESC+2 must be input after ESC+A+n for n/72 inch paper feed to become effective.
- In IBM Mode, the default of n is 12.
- In IBM Mode, n=0 is ineffective.

n/216 INCH PAPER FEED:

Sets programmable paper feed amount to n/216 inch.

Name: ESC+3+n
Dec.: 27, 51, n
Hex.: 1B, 33, n

Comments:

- n/216 inch paper feed is valid for $0 \leq n \leq 255$.
- In IBM Mode, n=0 is ineffective.

AUTOMATIC LINE FEED MODE: (IBM Mode only)

Automatically executes a Line Feed following a Carriage Return.

Name:	Set:	ESC+5+1	Release:	ESC+5+0
Dec.:		27, 53, 1		27, 53, 0
Hex.:		1B, 35, 01		1B, 35, 00

Comments:

- DIP Switch 3 also controls the auto line feed function (refer to Section 2.10). Setting this switch to the ON position is equivalent to executing the ESC+5+1 command. Similarly, setting the switch to the OFF position is equivalent to executing the ESC+5+0 command.
- LF is tied to CR in this mode.

FORM FEED (FF):

Feeds paper to next top of form position after first printing any data in the buffer.

Name: FF
Dec.: 12
Hex.: 0C

Comments:

- FF releases single-line double width printing set by SO (see page 6-17).
- Amount of form feed depends upon page length set by the page length control command.

LINE FEED (LF):

Causes data in buffer to be printed and then executes a single line feed.

Name: LF
Dec.: 10
Hex.: 0A

Comments:

- When the new line position falls within the perforation skip area, the paper advances to the next top of form position (when DIP switch 2 is ON).
- If there is no data, "space" data (ASCII 32), or blanks between HT print positions in the buffer, LF feeds the paper by only 1 line.
- The amount of spacing generated by LF is a function of the paper feed amount setting.
- LF code releases single-line double width printing set by SO.
- In IBM Mode only, DIP switch 7 controls the Automatic CR function. When this switch is OFF, LF executes a single line feed. The carriage, however, does not return to the left margin position. When this switch is ON, a Carriage Return command (CR) is added to each Line Feed (LF).

n/216 INCH PAPER FEED:

Prints out the data in the print buffer and feeds the paper n/216 inch.

Name: ESC+J+n
Dec.: 27, 74, n
Hex.: 1B, 4A, n

Comments:

- In the IBM Mode only, when DIP switch 7 (Automatic CR) is ON, Carriage Return command (CR) is added automatically to this command.
- Single-line, n/216 inch paper feed is valid for $0 \leqq n \leqq 255$.
- This command sets the paper feed for ONE line only. Subsequent paper feed returns to previous setting. However, the carriage does not return to the left margin position. Instead, printing of next line begins where previous printing left off.
- This command does not release single-line double width printing.

---

n/216 INCH REVERSE DIRECTION SINGLE LINE PAPER FEED: (Standard Mode only)

Prints out the data in the print buffer and feeds the paper n/216 inch in reverse direction.

Name: ESC+j+n
Dec.: 27, 106, n
Hex.: 1B, 6A, n

Comments:

- Reverse, single line n/216 inch paper feed is valid for $0 \leqq n \leqq 255$.
- This command sets reverse direction paper feed for one line only. The carriage will not return, however, to the left margin position. Instead, the printing of the next line begins where the previous printing left off.
- This command does not release single-line double width printing.

Notes:
- Reverse paper feed cannot be executed in the area within 3.6 inches (91.4 mm) of the bottom perforation. Additionally, the perforation should not be included in the area of reverse paper feed.
- Multi-part forms should not be used with reverse paper feed.

PAGE LENGTH (INCHES):

Sets page length in number of inches.

Name:	ESC+C+0+n	(Standard Mode $1 \leqq n \leqq 22$)
Dec.:	27, 67, 0, n	(IBM Mode $1 \leqq n \leqq 255$)
Hex.:	1B, 43, 00, n	

Comments:
- Upon receipt of ESC+C+0+n, the present line position becomes the top of page position.
- The value of n must be in the range $1 \leqq n \leqq 22$ (255 in IBM Mode).
- ESC+C+0+n releases the VT, VFU and skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.
- You can set the form length through the Control Table without using this command.

PAGE LENGTH (LINES):

Sets page length in number of lines.

Name:	ESC+C+n	(Standard Mode $1 \leq n \leq 127$)
Dec.:	27, 67, n	(IBM Mode $1 \leq n \leq 255$)
Hex.:	1B, 43, n	

Comments:

- Upon receipt of ESC+C+n, the present line position becomes the top of page position.
- The value of n must be in the range $1 \leq n \leq 127$ (255 in IBM Mode). If n=0, page length returns to the inch designation.
- ESC+C+n releases the VT, VFU and skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.

RIGHT MARGIN: (Standard Mode only)

Sets position of right margin.

Name:	ESC+Q+n
Dec.:	27, 81, n
Hex.:	1B, 51, n

Comments:

- Permissible values of "n" are given below.

PICA	$2 \leq n \leq 80$
ELITE	$3 \leq n \leq 96$
MICRON	$3 \leq n \leq 120$
COMPRESSED	$4 \leq n \leq 137$
ELITE COMPRESSED	$4 \leq n \leq 160$

- Any designation to the left of the left margin position is ignored.
- Setting the right margin clears all data in the buffer.
- In proportional spacing, the right margin is set with pica pitch.
- Once the right margin position is set, a change in the character mode will not alter this right margin setting.

LEFT MARGIN: (Standard Mode only)

Sets position of left margin.

Name: ESC+l+n
Dec.: 27, 108, n
Hex.: 1B, 6C, n

Comments:

- If the value of n exceeds the right margin value, ESC+l+n is ineffective and the left margin does not change.
- Setting the left margin position clears all data in the print buffer.
- In proportional spacing, the left margin is set with pica pitch.
- Once the left margin position is set, a change in the character mode will not alter this left margin setting.
- Permissible values of "n" are given below.

PICA	$0 \leqq n \leqq 78$
ELITE	$0 \leqq n \leqq 93$
MICRON	$0 \leqq n \leqq 117$
COMPRESSED	$0 \leqq n \leqq 133$
ELITE COMPRESSED	$0 \leqq n \leqq 156$

MARGIN SET: (IBM Mode only)

Sets positions of left and right margins.

Name: ESC+X+n_1+n_2
Dec.: 27, 88, n_1, n_2
Hex.: 1B, 58, n_1, n_2

Comments:

- The left margin column is set to n_1 in the current width, and the right margin column is set to n_2.
- If $n_2 < n_1$, it is ignored.
- Setting the margin clears all data in the buffer.
- Once the margin position is set, a change in the character width will not alter the settings.
- When n_1 or $n_2 = 0$, that margin does not change.
- Permissable values of n_1, n_2 are given below.

Pica print	$1 \leqq n_1 \leqq 79$	$2 \leqq n_2 \leqq 80$
Elite print	$1 \leqq n_1 \leqq 94$	$3 \leqq n_2 \leqq 96$
Compressed print	$1 \leqq n_1 \leqq 134$	$4 \leqq n_2 \leqq 137$

LEFT ALIGNMENT: (Standard Mode only)

Sets print alignment at the left margin.

Name: ESC+a+0
Dec.: 27, 97, 0
Hex.: 1B, 61, 00

Comments:
- This command clears the ESC+a+1, ESC+a+2 and ESC+a+3 settings.
- The printer defaults to this setting.
- 48, 128 and 176 can also be used in place of 0.

AUTO CENTERING: (Standard Mode only)

Enables automatic centering of a print line between the left and right margins.

Name: ESC+a+1
Dec.: 27, 97, 1
Hex.: 1B, 61, 01

Comments:
- This command clears the ESC+a+0, ESC+a+2 and ESC+a+3 settings.
- 49, 129 and 177 can also be used in place of 1.

RIGHT ALIGNMENT: (Standard Mode only)

Sets print alignment at the right margin.

Name: ESC+a+2
Dec.: 27, 97, 2
Hex.: 1B, 61, 02

Comments:
- This command clears the ESC+a+0, ESC+a+1 and ESC+a+3 settings.
- 50, 130 and 178 can also be used in place of 2.

AUTO JUSTIFICATION: (Standard Mode only)

Sets automatic justification of a print line between the left and right margins.

Name: ESC+a+3
Dec.: 27, 97, 3
Hex.: 1B, 61, 03

Comments:

- Printing is executed upon receipt of print execution commands (CR, LF, FF, etc.).
- Auto justification is executed when data exceeds right margin and upon receipt of print execution commands (CR, LF, FF, etc.).
- This command clears the ESC+a+0, ESC+a+1 and ESC+a+2 settings.
- 51, 131 and 179 can also be used in place of 3.

TOP OF FORM: (IBM Mode only)

Sets top of form.

Name: ESC+4
Dec.: 27, 52
Hex.: 1B, 34

Comment:

- This command sets the current paper position as the top of form.

SKIP PERFORATION:

Sets skip-over perforation.

Name:	Set: ESC+N+n	Release:	ESC+O
Dec.:	27, 78, n		27, 79
Hex.:	1B, 4E, n		1B, 4F

Comments:

- The value of n specifies the number of lines (or n times the current line spacing amount) to be skipped at the bottom of the page.
- This commands is effective only for $1 \leqq n \leqq 127$. For $n \geqq 128$, the value is processed as n-128.
- If n=0 or 128, this command is ignored.
- The skip perforation amount does not change even if the paper feed amount is changed following a skip perforation designation.
- The skip perforation setting is released upon receipt of the page length designation command.

HORIZONTAL TAB STOP SETTING:

Sets horizontal tabulations to specified values.

Name:	Set: ESC+D+n_1+n_2+...+n_x+0	Release:	ESC+D+0
Dec.:	27, 68, n_1, n_2,..., n_x, 0		27, 68, 0
Hex.:	1B, 44, n_1, n_2,..., n_x, 00		1B, 44, 00

Comments:

- Horizontal tabs are set from the left margin position.
- Horizontal tabs must be designated such that $n_1 < n_2 < \ldots < n_x$.
- A maximum of 32 tabs may be set on a single line.
- ESC+D+n_1+n_2+...+n_x+0 sets horizontal tab stops. The HT command on page 6-35 executes the tab designation.
- In proportional spacing, horizontal tabs are set with pica pitch.
- When the left margin is changed, horizontal tabs default to every 8 columns, beginning with the new left margin setting (Standard Mode only).
- When the margin is changed, horizontal tabs will be moved according new left margin setting. (IBM Mode only)

HORIZONTAL TAB EXECUTION:

Executes the horizontal TAB as designated by ESC+D+n_1+n_2+...+n_x+0.

Name: HT
Dec.: 9
Hex.: 09

Comments:

- If the value of the horizontal TAB is less than present column position, that HT is ignored.
- If the value of the horizontal TAB exceeds the maximum printing width, all data within correct printing range will be printed according to the HT setting(s). A single line feed is executed.
- When in underline mode, the blank spaces between consecutive HT print positions are not underlined.
- When the printer is powered up, TAB is automatically set every 8 characters.

VERTICAL TAB STOP SETTING:

Sets vertical tabulation to specified values.

Name:	Set:	ESC+B+n_1+n_2+...+n_x+0	Release: ESC+B+0
Dec.:		27, 66, n_1, n_2,..., n_x, 0	27, 66, 0
Hex.:		1B, 42, n_1, n_2,..., n_x, 00	1B, 42, 00

Comments:

- VT is set from the top of page position.
- Vertical tabs must be designated such that n_1<n_2...<n_x.
- A maximum of 16 tabs may be set (in Standard Mode).
- A maximum of 64 tabs may be set (in IBM Mode).
- ESC+B+n_1+n_2+...+n_x+0 sets vertical tab stops. The VT command on page 6-36 executes the tab designation.
- If the paper feed amount is changed after a VT designation, the VT positions remain as initially set.
- VT setting is released by page length designation commands.

VERTICAL TAB EXECUTION:

Executes the vertical TAB as designated by ESC+B+n_1+n_2+...+n_x+0, ESC+b+m+n_1+n_2+...+n_x+0.

Name: VT
Dec.: 11
Hex.: 0B

Comments:
(Standard Mode)
- When TABs are set with VT or VFU setting command and when there is no tab setting on a position exceeding present line, data is printed out and paper is fed to the next top of page position (same as FF).

(IBM Mode)
- When TABs are set with VT setting command and there is no tab setting on a position exceeding the present line, data is printed out and the paper is advanced one line (same as LF).
- When vertical TAB has not been set by ESC+B+n_1+n_2+...+n_x+0, or ESC+b+m+n_1+n_2+...+n_x+0, execution of VT causes data in the buffer to be printed and the paper to be advanced one line (same function as LF).

ALL TAB INITIAL CLEAR: **(IBM Mode only)**

Sets all tabs to power ON settings.

Name: ESC+R
Dec.: 27, 82
Hex.: 1B, 52

Comment:
This command sets horizontal tabs at every 8 position and clears all vertical tabs.

VFU CHANNEL SELECTION: **(Standard Mode only)**

Selects one of eight channels in the Vertical Format Unit VFU).

Name: ESC+/+n ($0 \leqq n \leqq 7$)
Dec.: 27, 47, n
Hex.: 1B, 2F, n

Comments:
- The value of n must be in the range $0 \leqq n \leqq 7$.
- Channel 0 is the default setting.

VFU SETTING: (Standard Mode only)

Sets the tab position of each channel in the VFU (Vertical Format Unit).

Name: Set: ESC+b+m+n_1+n_2+...+n_x+0 Release: ESC+b+m+0
($0 \leqq m \leqq 7$) ($1 \leqq x \leqq 16$)

Dec.:	27, 98, m, n_1, n_2,..., n_x, 0	27, 98, m, 0
Hex.:	1B, 62, m, n_1, n_2,..., n_x, 00	1B, 62, m, 00

Comments:

- The VFU has eight channels. A maximum of 16 vertical tabs can be set for each channel.
- The VFU is valid for $0 \leqq m \leqq 7$ and selects one channel based on the value of "m".
- Any VFU setting exceeding the page length is ineffective.
- To operate the VFU, input the VT code (11_{DEC}) after selecting the channel via VFU channel selection command (ESC+/+n).
- The VFU position does not change even if paper feed amount is altered after VFU setting.
- The VFU setting is released by the page length designation commands.
- The vertical tab specified with ESC+B+n_1+n_2+...+n_x+0 is set to VFU channel 0.

BACKSPACE:

Prints data in buffer and backspaces one space before printing next character.

Name:	BS
Dec.:	8
Hex.:	08

Comments:

- Since BS backspaces the width of a character, the backspacing amount will depend upon the character mode set when the BS code was received.
- This command is ignored in the word processing mode (ESC+a+1, ESC+a+2 or ESC+a+3).

CARRIAGE RETURN:

Prints all data in buffer and designates that the next line start at the left margin.

Name: CR
Dec.: 13
Hex.: 0D

Comments:

- Certain computers issue an automatic line feed with a carriage return. Check your computer manual for details.
- When DIP switch 3 is ON the paper is fed automatically (a LF is executed automatically) whenever a CR code is executed.

ONE LINE UNIDIRECTION PRINT:

(Standard Mode only)

Set one line single direction (left to right) printing mode.

Name: ESC+<
Dec.: 27, 60
Hex.: 1B, 3C

SINGLE DIRECTION:

Sets single direction (left to right) printing mode.

Name:	Set:	ESC+U+1	Release:	ESC+U+0
Dec.:		27, 85, 1		27, 85, 0
Hex.:		1B, 55, 01		1B, 55, 00

HALF SPEED PRINTING: (Standard Mode only)

Sets printing to half speed.

Name:	Set: ESC+s+1	Release:	ESC+s+0
Dec.:	27, 115, 1		27, 115, 0
Hex.:	1B, 73, 01		1B, 73, 00

Comment:

- Half speed printing can be set only in the pica, elite, standard density image, double speed double density image, and 720 dots/line image modes.

RELATIVE HORIZONTAL POSITION:

(Standard Mode only)

Moves the printhead to a relative horizontal position.

Name:	ESC+\+n_1+n_2
Dec.:	27, 92, n_1, n_2
Hex.:	1B, 5C, n_1, n_2

Comments:

- This command moves the printhead (n_1+256×n_2)/120 inch from current position at which point printing of following data will start.
- To calculate n_1 and n_2, first determine the total increments of 1/120" to move the printhead from its current position. If the head movement will be to the left subtract this number from 65336. Divide 256 into the determined number yielding n_2=the integer portion of the division and n_1=the remainder.

$$256 \overline{)\ \text{increments}}\ n_2$$
$$-256 \times n_2$$
$$n_1$$

- If the resullting movement would place the printhead outside current margins, the command is ignored.

ABSOLUTE HORIZONTAL POSITION:

(Standard Mode only)

Moves the printhead to an absolute horizontal position.

Name: ESC+$+$n_1$+$n_2$
Dec.: 27, 36, n_1, n_2
Hex.: 1B, 24, n_1, n_2

Comments:

- This command moves the printhead to a position $n_1+256\times n_2$ dots (units) from the left margin. Each unit equals 1/60th of an inch.
- To calculate n_1 and n_2, divide 256 into the determined number yielding n_2=the integer portion of the division and n_1=the remainder.

CANCEL:

Clears all data in the buffer.

Name: CAN
Dec.: 24
Hex.: 18

REMOTE PRINTER SELECT:

Selects the printer remotely, enabling it to receive data.

Name: DC1 (Device Control 1)
Dec.: 17
Hex.: 11

Comment:

- Receipt of DC1 while the printer is deselected by DC3 (Standard Mode) /ESC+Q+3 (IBM Mode) enables the printer to receive data.

REMOTE PRINTER DESELECT:

(Standard Mode only)

Deselects the printer remotely, disabling it from receiving data.

Name: DC3 (Device Control 3)
Dec.: 19
Hex.: 13

Comment:

- All data sent in deselect status becomes invalid. In order to return to select status, send DC1 code.

REMOTE PRINTER DESELECT: (IBM Mode only)

Deselects the printer remotely, disabling it from receiving data.

Name: ESC+Q+3
Dec.: 27, 81, 3
Hex.: 1B, 51, 03

Comment:

- All data sent in deselect status becomes invalid. In order to return to select status, send DC1 code.

DELETE: (Standard Mode only)

Deletes the last character stored in the buffer.

Name: DEL
Dec.: 127
Hex.: 7F

Comments:

- Only ordinary text may be DELeted. Bit image data, spacing between output generated by consecutive TABs, and character mode designation cannot be DELeted.
- This command is ignored in the word processing mode (ESC+a+1, ESC+a+2 or ESC+a+3).

MSB ON: (Standard Mode only)

Sets the Most Significant Bit to 1.

Name: ESC+>
Dec.: 27, 62
Hex.: 1B, 3E

Comments:
- ESC+> has no effect on bit image data.
- This setting can be released by ESC+#.

MSB OFF: (Standard Mode only)

Sets the Most Significant Bit to 0.

Name: ESC+=
Dec.: 27, 61
Hex.: 1B, 3D

Comments:
- ESC+= has no effect on bit image data.
- This setting can be released by ESC+#.

MSB CANCEL: (Standard Mode only)

Sets printer to receive 8th bit "as is".

Name: ESC+#
Dec.: 27, 35
Hex.: 1B, 23

Comment:
- This setting has no effect on bit image data.

UNDEFINED CODE PRINTING: (Standard Mode only)

Designates undefined codes in locations 0~31DEC, 128~159DEC as printing codes for international characters.

Name:	Set:	ESC+I+1	Release:	ESC+I+0
Dec.:		27, 73, 1		27, 73, 0
Hex.:		1B, 49, 01		1B, 49, 00

Comments:

- The following characters are printed out by this command.

Code (DEC)	Print Code	Code (DEC)	Print Code	Code (DEC)	Print Code
0	à	22	¨	140	(FF)
1	è	23	Ä	141	(CR)
2	ù	24	(CAN)	142	(SO)
3	ò	25	Ü	143	(SI)
4	ì	26	ä	144	§
5	°	27	(ESC)	145	ß
6	£	28	ü	146	(DC2)
7	(–)	29	É	147	(DC3)
8	(BS)	30	é	148	(DC4)
9	(HT)	31	¥	149	ø
10	(LF)	128	à	150	¨
11	(VT)	129	è	151	Ä
12	(FF)	130	ù	152	(CAN)
13	(CR)	131	ò	153	Ü
14	(SO)	132	ì	154	ä
15	(SI)	133	°	155	(ESC)
16	§	134	£	156	ü
17	ß	135	(–)	157	É
18	(DC2)	136	(BS)	158	é
19	(DC3)	137	(HT)	159	¥
20	(DC4)	138	(LF)		
21	ø	139	(VT)		

- International Characters reside in ASCII location 0-31DEC and 128–159DEC. While these characters are normally set as unprintable codes ESC+I+1 sets these as printable characters.

DRAFT FONT DOWNLOADING:(Standard Mode only)

Defines down line load characters into specified address locations in RAM.

Name: ESC+&+0+Cs+Ce+At+P_1+P_2+...+P_{11}
(0≦Cs≦Ce≦255)
Dec.: 27, 38, 0, Cs, Ce, At, P_1, P_2,..., P_{11}
Hex.: 1B, 26, 00, Cs, Ce, At, P_1, P_2,..., P_{11}

Comment:
- Refer to page 5-3.

NLQ FONT DOWNLOADING: (Standard Mode only)

Defines download NLQ font.

Name: ESC+&+2+Cs+Ce+At+P_{1H}+P_{1L}+...+P_{23L}
(0≦Cs≦Ce≦255)
Dec.: 27, 38, 2, Cs, Ce, At, P_{1H}, P_{1L},..., P_{23L}
Hex.: B1, 26, 02, Cs, Ce, At, P_{1H}, P_{1L},..., P_{23L}

Comment:
- Refer to page 5-8.

CHARACTER GENERATOR SELECTION:

(Standard Mode only)

Selects the character generator.

Name: ESC+%+n (n=0 or n=1)
Dec.: 27, 37, n
Hex.: 1B, 25, n

Comment:
- Refer to page 5-12.

CHARACTER GENERATOR SET COPY:

(Standard Mode only)

Copies internal CG font into downloadable font area.

Name: ESC+:+0+0+0
Dec.: 27, 58, 0, 0, 0
Hex.: 1B, 3A, 00, 00, 00

Comment:
- Refer to page 5-11.

6

DOWNLOADABLE CHARACTER DEFINITION:

(IBM Mode only)

Defines download characters into specified address locations.

Name: ESC+=+n_1+n_2+m+Cs+At_1+At_2+Data
($0 \leq Cs \leq 255$)
Dec.: 27, 61, n_1, n_2, m, Cs, At_1, At_2, Data
Hex.: 1B, 3D, n_1, n_2, m, Cs, At_1, At_2, Data

Comment:
- Refer to Section 5.2 on page 5-13 (Draft and Text) and 5-19 (NLQ) for detailed information.

ESCAPE:

First byte of each multi-byte printer control code.

Name: ESC
Dec.: 27
Hex.: 1B

Comment:
- Cannot be generated by the ESC key on certain computers.

NULL:

Used in certain multi-byte printer control codes.

Name: NUL
Dec.: 0
Hex.: 00

RESET PRINTER: (Standard Mode only)

Initializes printer, causing data in the printer buffer, but not in the receive buffer, to be cleared.

Name: ESC+@
Dec.: 27, 64
Hex.: 1B, 40

Comment:

- Refer to Section 3.4 for an explanation of printer initialization.

PAPER-OUT DETECTION:

Enables paper-out detector.

Name:	Set:	ESC+9	Release:	ESC+8
Dec.:		27, 57		27, 56
Hex.:		1B, 39		1B, 38

Comment:

- Disabling of the paper-out detector causes printing to continue after paper end.

CUT SHEET FEEDER: (Standard Mode only)

Selects Cut Sheet Feeder (CSF) mode ON/OFF.

Name: ESC+EM+n
Dec.: 27, 25, n
Hex.: 1B, 19, n

Comment:

- The following values of n can be used.
  n="0": Cut Sheet Feeder mode is OFF
  n="4": Cut Sheet Feeder mode is ON

Note:

- If the Cut Sheet Feeder is not installed and ESC+EM+4 is executed, the printer will not feed the paper correctly.

7. Interfacing

Parallel Interfacing

Communication with a computer is accomplished through a parallel interface based on the Centronics standard.

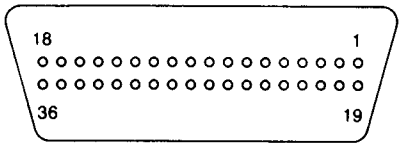
Specifications:

- data transfer speed: 1000 cps minimum
- synchronization: external STROBE pulse
- logic levels: TTL
- handshaking: BUSY and $\overline{\text{ACK}}$ signals
- connector type: 57-30360 (AMPHENOL) or equivalent
- cable: use a shielded cable 2 meters or less in length.

When the printer is processing data, the BUSY signal is high. The printer will not accept new data from the computer. After the processing is completed,the BUSY signal goes low. (The BUSY signal is also high when the printer is OFF LINE). When the busy signal occurs, the $\overline{\text{ACK}}$ signal goes low indicating to the computer that the data has been processed and the printer is ready to accept more data. This handshaking routine occurs each time a character is sent to the printer.

	BUSY	SLCT	PO	ERROR
ON LINE	LOW	HIGH	LOW	HIGH
OFF LINE	HIGH	LOW	LOW	LOW
PAPER OUT	HIGH	LOW	HIGH	LOW

Printer Status Signals



Note: This is not a 57-30360 connector.

Parallel Interface Connector
(Printer side)

Signal pin	Return side pin	Signal	Directin
1	19	$\overline{\text{STB}}$	Input
2	20	DATA 1	Input
3	21	DATA 2	
4	22	DATA 3	
5	23	DATA 4	
6	24	DATA 5	
7	25	DATA 6	
8	26	DATA 7	
9	27	DATA 8	
10	28	$\overline{\text{ACK}}$	Output
11	29	BUSY	Output
12		PO	Output
13		SLCT	Output
14		$\overline{\text{AUTO FEED XT}}$	Input
15			
16		SG	
17		FG	
18		+5 V	Output
31	30	$\overline{\text{PRIME}}$	Input
32		$\overline{\text{ERROR}}$	Output
33		SG	
34			
35			
36			

Pin Configuration

Notes:

- "INPUT" refers to a signal coming into the printer. "OUTPUT" denotes a signal exiting the printer.
- "RETURN" denotes the return side wire of a twisted pair cable and is connected to signal ground.
- All interface signals are at TTL levels.

Connector pin signals

$\overline{\text{STB}}$...STROBE

- This is a synchronizing input signal to read data into the printer.
- This signal is normally high. Data is read in when it goes low.
- The pulse must be low for at least 1 microsecond.

DATA 1-DATA 8

- These are the input signals which carry the 8 data bits of information.
- The signal is read in synchronization with the STROBE pulse. A high level indicates a logical "1".
- The signal must be present 0.5 microsecond before and after the STROBE pulse.

$\overline{\text{ACK}}$...ACKNOWLEDGE

- This is an output signal to the computer indicating that the printer is ready to receive the next block of data. It is sent out when the BUSY signal drops from high to low. Therefore, it can be thought of as a data request pulse.
- The signal is normally high. When the condition becomes true, the signal goes low.
- The $\overline{\text{ACK}}$ signal is automatically sent whenever the printer is switched ON LINE.

BUSY

- This output signal indicates the status of the printer. The signal is high when the printer is busy and cannot receive data.
- The signal is high under the following conditions:
    1. receive buffer full
    2. printer is processing data.
    3. printer is OFF LINE
    4. printer is in an error condition

PO...PAPER OUT

- This output signal indicates that paper out detector detects the absence of paper.
- The signal is normally low and goes high during a "Paper Out" condition.

SLCT...SELECT

- SELECT is an output signal which indicates the ON LINE or OFF LINE state of the printer. The signal is high in the ON LINE state and low when OFF LINE.
- The printer enters the ON LINE state:
  1. when the printer is turned on
  2. when $\overline{\text{PRIME}}$ is received
  3. when the RESET command is received
  4. when the ON LINE switch is pressed

- The printer enters the OFF LINE state:
  1. when the printer is out of paper
  2. when the printer is switched OFF LINE

$\overline{\text{AUTO FEED XT}}$ ($\overline{\text{AFXT}}$)

- This input signal determines if a line feed (LF) command will be added to each carriage return (CR).
- When $\overline{\text{AFXT}}$ is low, CR+LF action occurs. When $\overline{\text{AFXT}}$ is high, only a carriage return is performed.

- DIP SW3 can alter the response by the printer to an $\overline{\text{AFXT}}$ signal. If SW3 is ON, the printer will perform a CR+LF regardless of the level of the incoming signal. When SW3 is OFF, this automatic action is disabled.

SG...SIGNAL GROUND

- The twisted pair return wires (pins 19-30) are connected to signal ground.

FG...FRAME GROUND

- Frame ground is the same as chassis ground.

+5 V

- This is for evaluation only. It should not be used to supply power for external equipment.

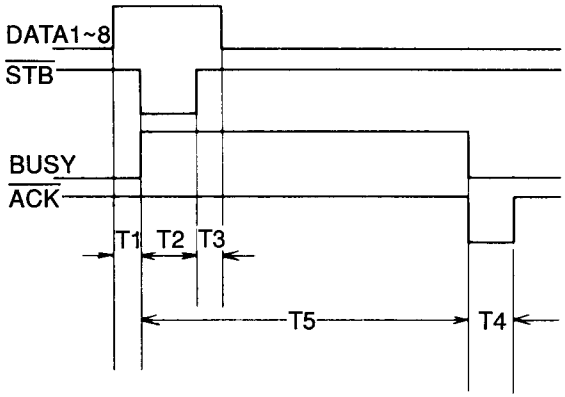
$\overline{\text{PRIME}}$

- This input signal is used to initialize the printer. The signal is normally high and goes low to reset the printer. It can be received anytime during printer operation.

$\overline{\text{ERROR}}$

- This output signal is an "error" or "fault" condition. Normally high, this signal goes low when an error occurs. An error condition can be caused by:
  1. a "Paper Out" condition
  2. the printer being OFF LINE

Timing Chart
(When normal printing code is received)



T1...0.5μs (Min)
T2...1μs (Min)
T3...0.5μs (Min)
T4...5μs (Max)
T5...1ms or less when buffer is not full
1s or less when buffer full

Timing Diagram

8. Maintenance

The printer does not require any routine maintenance. However, reasonable care of the printer will extend its life. The following preventive and periodic measures are recommended:

Precautions

- Keep all liquids away from the printer. Accidental spillage of a liquid into the printer can cause severe damage.

- Do not block the air flow around the printer. Do not place books, paper, or other items on top of the printer.

- Special care should be taken to protect the printer if it is used in an unfriendly environment such as a machine shop, a dusty or sandy area, etc.

- The life of the printhead can be extended by observing a few simple precautions.

  - Do not operate the printer without paper and a ribbon cassette installed.

  - Avoid continuous use of the same pins (underline, semigraphics, etc.) without allowing the print head time to cool.

  - Do not obstruct the movement of the print head while in operation.

- If the printer is not going to be used for an extended period, unplug the power cord.

Periodic Maintenance

Cleaning the unit is the most important action the user can perform. The frequency of cleaning is dependent upon the environment.

- Turn the power OFF.

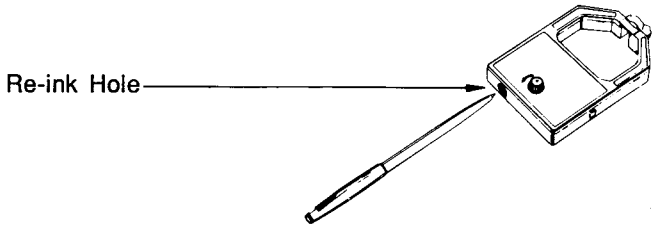
- Clean the case and covers with a soft cloth. Use any mild commercial cleaner.

- Remove the top and the smoked plastic covers. Vacuum or dust the inside area of the unit. Be very careful not to damage the flex ribbon cable and the carriage drive belt.

- The platen should be cleaned with denatured alcohol only.

- The carriage guide bar can be lubricated with a very light oil.

Ribbon Cassette
A single ribbon permits the printing of about 4 million characters. When the printing starts to fade, gently push the counter spring in the ribbon cassette hole with the tip of a ballpoint pen or other object. Once the ribbon cassette is mounted onto the carriage and printing is performed for a short time, the characters become darker.



Note:
- Do not push this before the printing starts to fade. If the ribbon has too much ink, the characters may smear when printed.

- Wear and tear of the print head pins may cause serious damage of the ribbon and printing to fade. In such case the printer needs servicing.

Troubleshooting

Most problems associated with the printer can be traced to improper setup, installation, or cabling. The table on page 8-3 will assist the user in identifying and correcting some of the more common problems. If you need additional help, contact the store from which the unit was purchased.

SYMPTOM	POSSIBLE CAUSE	PROBABLE SOLUTION
Printer does not power up	No AC Power	Check Power Cord
Power on but printer not printing	Printer not ON LINE Interface cable not connected	Press ON LINE switch Secure connection
Printer won't go ON LINE	Out of paper	Replace paper
Paper slips around platen	Paper feed selector in "T" position	Set selector to "F"
Head moves but does not print	Ribbon not installed correctly	Re-insert ribbon
Paper wrinkles when using tractor feed	No reverse tension on paper. Selector switch is in "F" position	Set paper supply lower than printer Set selector to "T"
Paper bunches up around platen	No reverse tension on paper	Set paper supply lower than printer
Cannot change form length	* Cut sheet feeder is ON	* Set CSF DIP switch as required
Printout double-spaced or no spacing	* Auto LF is ON	* Set Auto LF DIP switch as required
Cannot print ASCII characters with code above 127, italic characters printing	7 bit/8 bit switch set incorrectly on printer or interface	* Set DIP switch SW5 as required
Wrong character set printed	* Wrong character set selected	* Set DIP switch SW1, 6, 7, 8 as required
Cannot change print mode from computer	FONT and PITCH modes are set incorrectly	Set to Pgm mode Normal condition. Refer to Section 3.1

(* Pertains to DIP switch settings.)

Appendix A

Standard Mode Italic Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	`	p			SP	*0*	*@*	*P*	*`*	*p*
1		DC1	!	1	A	Q	a	q		DC1	*!*	*1*	*A*	*Q*	*a*	*q*
2		DC2	"	2	B	R	b	r		DC2	*"*	*2*	*B*	*R*	*b*	*r*
3		DC3	#	3	C	S	c	s		DC3	*#*	*3*	*C*	*S*	*c*	*s*
4		DC4	$	4	D	T	d	t		DC4	*$*	*4*	*D*	*T*	*d*	*t*
5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*
6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*
7			'	7	G	W	g	w			*'*	*7*	*G*	*W*	*g*	*w*
8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*
9	HT	EM	)	9	I	Y	i	y	HT	EM	*)*	*9*	*I*	*Y*	*i*	*y*
A	LF		*	:	J	Z	j	z	LF		*	*:*	*J*	*Z*	*j*	*z*
B	VT	ESC	+	;	K	[	k	{	VT	ESC	*+*	*;*	*K*	*[*	*k*	*{*
C	FF		,	<	L	\	l	|	FF		,	*<*	*L*	**	*l*	*|*
D	CR		-	=	M	]	m	}	CR		-	*=*	*M*	*]*	*m*	*}*
E	SO		.	>	N	^	n	~	SO		.	*>*	*N*	*^*	*n*	*~*
F	SI		/	?	O	_	o	DEL	SI		*/*	*?*	*O*	*_*	*o*	*DEL*

Appendix A

Standard Mode Graphic Character Set 1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	`	p			á				α	≡
1		DC1	!	1	A	Q	a	q		DC1	í				β	±
2		DC2	"	2	B	R	b	r		DC2	ó				Γ	≥
3		DC3	#	3	C	S	c	s		DC3	ú				π	≤
4		DC4	$	4	D	T	d	t		DC4	ñ				Σ	
5			%	5	E	U	e	u			Ñ				σ	
6			&	6	F	V	f	v			ª				μ	÷
7			'	7	G	W	g	w			º				τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿				Φ	○
9	HT	EM	)	9	I	Y	i	y	HT	EM					θ	●
A	LF		*	:	J	Z	j	z	LF						Ω	•
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½				δ	√
C	FF		,	<	L	\	l	|	FF		¼				∞	
D	CR		-	=	M	]	m	}	CR		¡				ø	
E	SO		.	>	N	^	n	~	SO		<<				∈	■
F	SI		/	?	O	_	o	DEL	SI		>>				∩	SP

A

Standard Mode Graphic Character Set 2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	`	p	Ç	É	á				α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í				β	±
2		DC2	"	2	B	R	b	r	é	Æ	ó				Γ	≥
3		DC3	#	3	C	S	c	s	â	ô	ú				π	≤
4		DC4	$	4	D	T	d	t	ä	ö	ñ				Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ				σ	⌡
6			&	6	F	V	f	v	å	û	a				μ	÷
7			'	7	G	W	g	w	ç	ù	o				τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿				Φ	°
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐				θ	•
A	LF		*	:	J	Z	j	z	è	Ü	¬				Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	¢	½				δ	√
C	FF		,	<	L	\	l	¦	î	£	¼				∞	ⁿ
D	CR		-	=	M	]	m	}	ì	¥	¡				ø	²
E	SO		.	>	N	^	n	~	Ä	Pt	<<				∈	■
F	SI		/	?	O	_	o	DEL	Å	ƒ	>>				∩	SP

Appendix A

IBM Mode Character Set 1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	`	p			á				α	≡
1		DC1	!	1	A	Q	a	q		DC1	í				ß	±
2		DC2	"	2	B	R	b	r		DC2	ó				Γ	≥
3			#	3	C	S	c	s			ú				π	≤
4		DC4	$	4	D	T	d	t		DC4	ñ				Σ	⌠
5			%	5	E	U	e	u			Ñ				σ	⌡
6			&	6	F	V	f	v			ª				µ	÷
7			'	7	G	W	g	w			º				τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿				Φ	°
9	HT		)	9	I	Y	i	y	HT		⌐				θ	∙
A	LF		*	:	J	Z	j	z	LF		¬				Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½				δ	√
C	FF		,	<	L	\	l	|	FF		¼				∞	ⁿ
D	CR		-	=	M	]	m	}	CR		¡				ø	²
E	SO		.	>	N	^	n	~	SO		<<				ε	■
F	SI		/	?	O	_	o		SI		>>				∩	SP

A

IBM Mode Character Set 2

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3	♥		#	3	C	S	c	s	â	ô	ú		├	╙	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	•
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	■	δ	√
C	FF		,	<	L	\	l	|	î	£	¼	╝	╠	▐	∞	ⁿ
D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E	SO		.	>	N	^	n	~	Ä	Pt	<<	╛	╬	▄	ε	■
F	SI		/	?	O	_	o		Å	ƒ	>>	┐	╧	▀	∩	SP

Note: In NLQ mode, the printer prints Pts for Pt.

Appendix A

IBM Mode All Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	▶	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3	♥	!!	#	3	C	S	c	s	â	ô	ú	▒	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	▒	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	å	ò	Ñ	▒	┼	╒	σ	⌡
6	♠	-	&	6	F	V	f	v	å	û	a	▒	╞	╓	µ	÷
7	•	↨	'	7	G	W	g	w	ç	ù	o	▒	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	▒	╚	╪	Φ	○
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┘	θ	●
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	▒	╩	┌	Ω	·
B	♂	←	+	;	K	[	k	{	ï	¢	½	▒	╦	▉	δ	√
C	♀	∟	,	<	L	\	l	|	î	£	¼	▒	╠	▉	∞	ⁿ
D	♪	↔	–	=	M	]	m	}	ì	¥	¡	▒	═	▉	ø	²
E	♫	▲	.	>	N	^	n	~	Ä	Pt	<<	▒	╬	▉	ε	■
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	>>	▒	╧	▉	∩	SP

Note: In NLQ mode, the printer prints Pts for Pt.

A

International Character Set

	n	35D 23H	36D 24H	64D 40H	91D 5BH	92D 5CH	93D 5DH	94D 5EH	96D 60H	123D 7BH	124D 7CH	125D 7DH	126D 7EH
USA	0	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	1	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	2	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	3	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK I	4	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	5	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	6	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN I	7	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	8	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY	9	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	10	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN II	11	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
LATIN AMERICA	12	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú

Appendix B

Proportional Spacing Tables

ASCII Characters
Standard Mode Characters

ASCII code	Char.	Width	
		Normal	Italic
0	â	12	11
1	è	12	11
2	ù	11	11
3	ò	10	11
4	ì	8	8
5	°	8	8
6	£	12	12
7	ì	5	10
8	¿	12	11
9	Ñ	12	12
10	ñ	11	12
11	¤	12	12
12	Pt	12	12
13	Å	12	12
14	å	12	11
15	ç	11	11
16	§	10	12
17	ß	11	11
18	Æ	12	12
19	æ	12	12
20	Ø	12	12
21	ø	12	11
22		8	9
23	Ä	12	12
24	Ö	12	12
25	Ü	12	12
26	ä	12	11
27	ö	10	11
28	ü	11	12
29	É	12	12
30	è	12	11
31	¥	12	12
32	SPACE	12	12
33	!	5	10
34	"	8	10
35	#	12	12
36	$	12	11
37	%	12	12
38	&	12	12
39	'	5	5
40	(	6	8
41	)	6	8
42	*	12	12
43	+	12	12

ASCII code	Char.	Width	
		Normal	Italic
44	,	7	8
45	–	12	12
46	.	6	7
47	/	10	10
48	0	12	12
49	1	8	9
50	2	12	12
51	3	12	12
52	4	12	12
53	5	12	12
54	6	12	11
55	7	12	12
56	8	12	12
57	9	12	11
58	:	6	8
59	;	6	9
60	<	10	10
61	=	12	11
62	>	10	9
63	?	12	11
64	@	12	12
65	A	12	12
66	B	12	12
67	C	12	12
68	D	12	12
69	E	12	12
70	F	12	12
71	G	12	12
72	H	12	12
73	I	8	10
74	J	11	12
75	K	12	12
76	L	12	10
77	M	12	12
78	N	12	12
79	O	12	12
80	P	12	12
81	Q	12	12
82	R	12	12
83	S	12	12
84	T	12	12
85	U	12	12
86	V	12	11
87	W	12	12

ASCII code	Char.	Width	
		Normal	Italic
88	X	10	12
89	Y	12	12
90	Z	10	12
91	[	8	11
92	\	10	7
93	]	8	11
94	^	12	10
95	_	12	12
96	`	5	5
97	a	12	11
98	b	11	11
99	c	11	11
100	d	11	12
101	e	12	11
102	f	10	12
103	g	11	11
104	h	11	11
105	i	8	9
106	j	9	10
107	k	10	11
108	l	8	9
109	m	12	11
110	n	11	10
111	o	12	11
112	p	11	11
113	q	11	11
114	r	11	10
115	s	12	11
116	t	11	10
117	u	12	11
118	v	12	10
119	w	12	12
120	x	10	12
121	y	12	11
122	z	10	12
123	{	9	10
124	¦	5	9
125	}	9	10
126	~	12	12
127	Ø	12	12

Unit: 1/120 inch (0.21 mm)

IBM Mode Characters

ASCII code	Char.	Width
0	à	12
1	è	12
2	ù	12
3	ò	11
4	ì	8
6	£	12
7	ì	12
8	¿	12
9	Ñ	12
10	ñ	12
12	Pt	12
13	À	12
14	å	12
15	ç	12
16	§	12
18	Æ	12
19	æ	12
23	Ä	12
24	Ö	11
25	Ü	12
26	ä	12
27	ö	11
28	ü	12
29	É	12
30	é	12
31	¥	12
32	SPACE	12
33	!	5
34	"	8
35	#	12
36	$	12
37	%	12
38	&	12
39	'	6
40	(	6
41	)	6
42	*	12
43	+	12
44	,	6
45	–	12
46	.	6
47	/	10
48	0	12
49	1	8

ASCII code	Char.	Width
50	2	12
51	3	12
52	4	12
53	5	12
54	6	12
55	7	12
56	8	12
57	9	12
58	:	6
59	;	6
60	<	10
61	=	12
62	>	10
63	?	10
64	@	12
65	A	12
66	B	12
67	C	12
68	D	12
69	E	12
70	F	12
71	G	12
72	H	12
73	I	8
74	J	12
75	K	12
76	L	12
77	M	12
78	N	12
79	O	12
80	P	12
81	Q	12
82	R	12
83	S	12
84	T	12
85	U	12
86	V	12
87	W	12
88	X	10
89	Y	12
90	Z	12
91	[	8
92	\	10
93	]	8

ASCII code	Char.	Width
94	^	12
95	_	12
96	`	6
97	a	12
98	b	11
99	c	11
100	d	11
101	e	12
102	f	12
103	g	11
104	h	12
105	i	8
106	j	8
107	k	10
108	l	8
109	m	12
110	n	12
111	o	11
112	p	11
113	q	11
114	r	11
115	s	12
116	t	10
117	u	12
118	v	12
119	w	12
120	x	10
121	y	12
122	z	10
123	{	9
124	¦	4
125	}	9
126	~	12
127	Ø	12

Unit: 1/120 inch (0.21 mm)

Appendix B

IBM Graphic Characters
Standard Mode Characters

ASCII code	Char.	Width	
		Normal	Italic
21	§	10	12
128	Ç	12	12
129	ü	11	12
130	é	12	11
131	â	12	12
132	ä	12	11
133	à	12	11
134	å	12	11
135	ç	11	11
136	ê	12	12
137	ë	12	11
138	è	12	11
139	ï	8	10
140	î	10	11
141	ì	8	8
142	Ä	12	12
143	Å	12	12
144	É	12	12
145	æ	12	12
146	Æ	12	12
147	ô	10	12
148	ö	10	11
149	ò	10	11
150	û	11	11
151	ù	11	11
152	ÿ	12	11
153	Ö	12	12
154	Ü	12	12
155	¢	11	11
156	£	12	12
157	¥	12	12
158	Pt	12	12
159	*f*	11	12
160	á	12	11
161	í	8	10
162	ó	10	12
163	ú	11	11
164	ñ	11	12
165	Ñ	12	12
166	a	12	11
167	o	12	12
168	¿	12	11
169	⌐	12	12
170	¬	12	12

ASCII code	Char.	Width	
		Normal	Italic
171	½	12	12
172	¼	12	12
173	¡	5	10
174	<<	12	12
175	>>	12	12
224	α	12	12
225	β	11	11
226	Γ	10	12
227	π	12	12
228	Σ	10	12
229	σ	11	12
230	μ	11	12
231	τ	12	12
232	Φ	10	12
233	θ	12	12
234	Ω	12	12
235	δ	12	11
236	∞	12	12
237	ϕ	12	12
238	ϵ	10	10
239	∩	10	12
240	≡	12	12
241	±	12	12
242	≥	10	10
243	≤	10	10
246	÷	12	12
247	≈	12	12
248	°	8	8
249	∙	6	6
250	·	6	6
251	√	12	12
252	^{n}	8	8
253	^{2}	8	8
254	■	8	8
255	SP	12	12

Unit: 1/120 inch (0.21 mm)

IBM Mode Characters

ASCII code	Char.	Width
0	Ø	12
1	☺	12
2	☻	12
3	♥	12
4	♦	10
5	♣	12
6	♠	12
7	•	12
8	◘	12
9	○	12
10	◙	12
11	♂	12
12	♀	12
13	♪	12
14	♫	12
15	☼	12
16	►	12
17	◄	12
18	↕	12
19	!!	12
20	¶	12
22	▬	12
23	↨	12
24	↑	12
25	↓	12
26	→	12
27	←	12
28	∟	12
29	↔	12
30	▲	12
31	▼	12
127	⌂	12
128	Ç	12
131	â	12
136	ê	12
139	ï	9
140	î	10
147	ô	11
150	û	12
152	ÿ	11
155	¢	12
159	ƒ	12
160	á	12
161	í	12

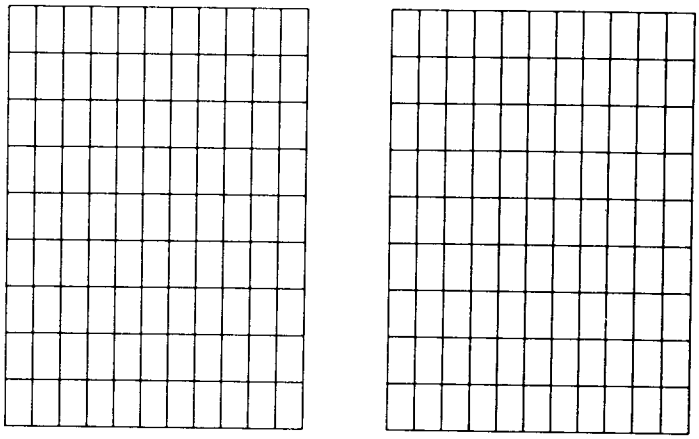
ASCII code	Char.	Width
162	ó	12
163	ú	12
166	ª	12
167	º	12
169	⌐	12
170	¬	12
171	½	12
172	¼	12
174	<<	12
175	>>	12
224	α	12
225	ß	12
226	Γ	11
227	π	12
228	Σ	12
229	σ	12
230	µ	12
231	τ	11
232	Φ	12
233	Θ	12
234	Ω	12
235	δ	12
236	∞	12
237	∅	12
238	ε	10
239	∩	12
240	≡	12
241	±	12
242	≥	10
243	≤	10
246	÷	12
247	≈	11
248	°	8
249	•	6
250	·	6
251	√	12
252	ⁿ	10
253	²	8
254	■	8

Unit: 1/120 inch (0.21 mm)

Appendix C

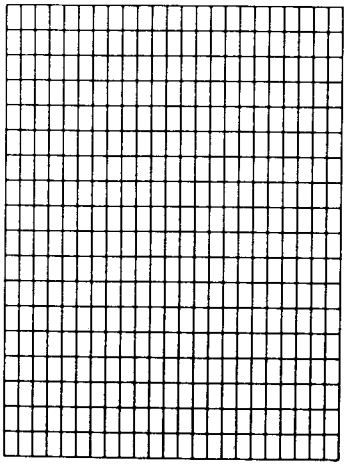
Download Character Matrix Blanks: Draft

9×11



Download Character Matrix Blanks: NLQ

18×23



C

Make copies of this page first.
Then use blank matrices to design your down line load characters.

Paper

1. Continuous paper

A list of the paper which may be used with this unit is provided below.

Width: 4~10 inches (102~254 mm).

Quality and number of sheets: * only for the last sheet

Type of paper	Sheets	Weight			
		in lbs		in g/m²	
		rear	bottom	rear	bottom
Fine-quality paper	1	16~24	16~22	60~90	60~83
Non-carbon	2~4	11~14 (17*)		41~53 (64*)	
Multi-layered with carbon	2	11~14 (17*)		41~53 (64*)	

Notes:

- For optimum paper handing, when using some types of thicker multi-part continuous paper, we suggest the use of the bottom feed paper path.
- When using multi-part continuous paper in environments which have very high or low temperature and/or humidity, we recommend the use of the bottom feed to optimize paper handling and print quality.
- In multi-layered paper with carbon, the carbon is equivalent to a sheet of paper.
- "Weight in pounds" represents the weight of 500 [17×22 inches (432×559 mm)] sheets.

2. Single Sheet

Width: 4~11.7 inches (102~297 mm)
Height: 5~14.3 inches (127~363 mm)
Weight in pounds (g/m²): 14~24 (53~90 g/m²)

Notes:

- The printer will handle multi-part papers up to 0.013 inch (0.32 mm) thick. Up to 4 copies of 14 lb. chemical release paper can be used.
- Paper should be within operating temperature and humidity ranges at least 24 hours prior to use.

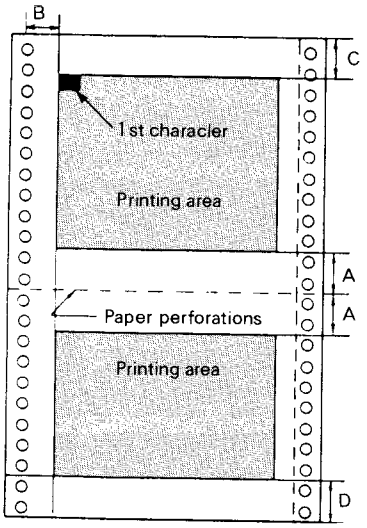
3. Envelope

#10 size envelope is recommended. Since envelopes vary in size, paper weight and construction, we cannot guarantee print quality and paper handling for all types.

Appendix E

Printing Area

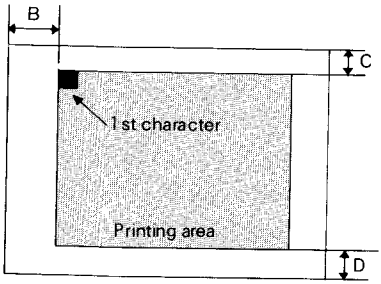
1. Continuous paper



	Rear	Bottom
A	1" (25.4 mm)	
B	0.76" (19.4 mm)	
C	0.80" (20.3 mm)	3.6" (91.5 mm)
D	1.5" (38.1 mm)	0.95" (24.1 mm)

A: Value A indicates the positions near the paper perforations where the printing quality may not be optimum.
B: Value B indicates the position where the first character is printed. (When the left tractor is set on the left end.)
C: Value C indicates the area from the top of the paper to the position where the first character is printed.
D: Value D indicates the position where paper out is detected.

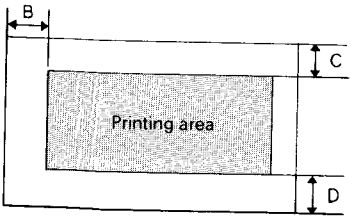
2. Single Sheet



B	1.85" (47 mm)
C	0.80" (20.3 mm)
D	1" (25.4 mm)

B: Value B indicates the position where the first character is printed.
C: Value C indicates the area from the top of the paper to the position where the first character is printed.
D: Value D indicates the position where paper out is detected.

Envelope



B	1" (25.4 mm)
C	0.80" (20.3 mm)
D	1" (25.4 mm)

E

Index

Software commands of Standard mode and IBM mode descriptions are not indexed here.

For page references for commands see pages 6-1 through 6-9 in section 6.

A

Adjusting the printing head gap 2-4
Aligning the top of form 2-10
ASCII tables B-1

B

Back tension plate 2-10
Bit image 5-21
  8-pin Bit Image 5-23
  9-pin Bit Image 5-25

C

Center paper support 1-7
Character pitch 5-1
Character set 1-3
  Standard mode A-1
  IBM mode A-4
  International A-7
Column indicator light 1-6, 3-4, 3-5
COLUMN switch 1-6, 3-3, 3-4
Connecting to Computer 2-11
Control Table 1-6, 3-4
  Setting 3-4
Control Table switches
  COLUMN switch 1-6, 3-3, 3-4
  SET switch 1-6, 3-3, 3-4, 3-5
  ROW switch 1-6, 3-3, 3-4

D

Detectors 3-8
DIP switch setting 2-11
Dot density 5-21
Double height printing 5-2
Double printing 5-2
Double width printing 5-2
Download characters 5-3

E

Emphasized printing 5-2
EZ Set Operator panel 1-1, 1-6, 3-4

F

FF switch 1-6, 3-2, 3-3, 3-4
Function mode 3-4
FUNCTION switch 1-6, 3-3, 3-4

H

Head gap lever 1-7, 2-4
Head nose 2-3
Hex. Dump 3-9

I

Initialization 3-9
Ink ribbon cassette 1-7, 2-3, 8-2
Interfacing 7-1

L

LF switch 1-6, 3-2, 3-3, 3-4

Index

M

MEMO LOAD 1-1, 3-7
MICRO LINE FEED 1-1, 3-1
  FORWARD 3-2
  REVERSE 3-2

N

Nose cover 2-3

O

ON LINE indicator light 1-6, 3-4
ON LINE switch 1-6, 3-1
3-3, 3-5
Out of paper detector 3-8
Overheat detector 3-8
Overline printing 5-2

P

Paper D-1
  Envelope D-1
  Installation 2-5~2-9
Paper bail release lever 1-7, 2-5, 2-6
2-7, 2-8, 3-7
Paper feed selector 1-7, 2-5
Paper guide 1-7, 2-5
Parallel Interface connector 1-8, 7-1
PERFORATION CUT 1-1, 3-3
Platen knob 1-7, 1-8
POWER/PAPER OUT
  Indicator light 1-6, 3-4
Power switch 1-8, 2-4
Power up 2-4
Print head 1-7
Printing Area E-1
Print pitch 1-1, 5-1
Proportional Spacing tables B-1
Protective paper 2-2

Q

Quiet mode 1-1, 3-6

R

ROW indicator light 1-6, 3-4
ROW switch 1-6, 3-4
Ruler 1-7

S

Self test 2-10
SET switch 1-6, 3-4, 3-5
Site requirements 2-1
Smoked plastic cover 1-7, 2-2
Specifications 1-3~1-5

T

Top cover 1-7
Top of form 2-10
Tractor 1-7, 2-6, 2-8
Tractor clamping lever 1-7, 2-6
2-8

U

Underline printing 5-2

W

Wing tab 2-3

FOR USERS IN CONTINENTAL UNITED STATES ONLY

TECHNICAL SUPPORT CALLS

If you have read this manual and tried the troubleshooting procedures and you are still having difficulty please contact the store from which the unit was purchased.

You may also call the technical support telephone number which is operational during east coast business hours (9:00 AM to 5:00 PM).

The technical support number is: 1-800-222-0584
(Options and supplies: 1-800-346-4768)

OPTION and SUPPLIES

KX-P19	RS-232C/Current Loop Serial Interface Board
KX-P37	Auto Cut Sheet Feeder (Single bin)
KX-P43	32K Buffer Chip
KX-P115	Ribbon Cassette (Black)

Panasonic Industrial Company, Computer Products Div.
Division of Matsushita Electric Corporation of America
Two Panasonic Way, Secaucus, New Jersey 07094

Panasonic Hawaii, Inc. (PHI)
99-859 Iwaiwa Street, Honolulu, Hawaii 96808-0774

Panasonic Sales Company
Ave. 65 De Infanteria, KM 9.7 Victoria Industrial Park Carolina,
Puerto Rico 00630

Matsushita Electric Canada Limited
5770 Ambler Drive, Mississauga, Ontario, L4W 2T3

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

Printed in Japan

PJQX5725ZC S0888T2